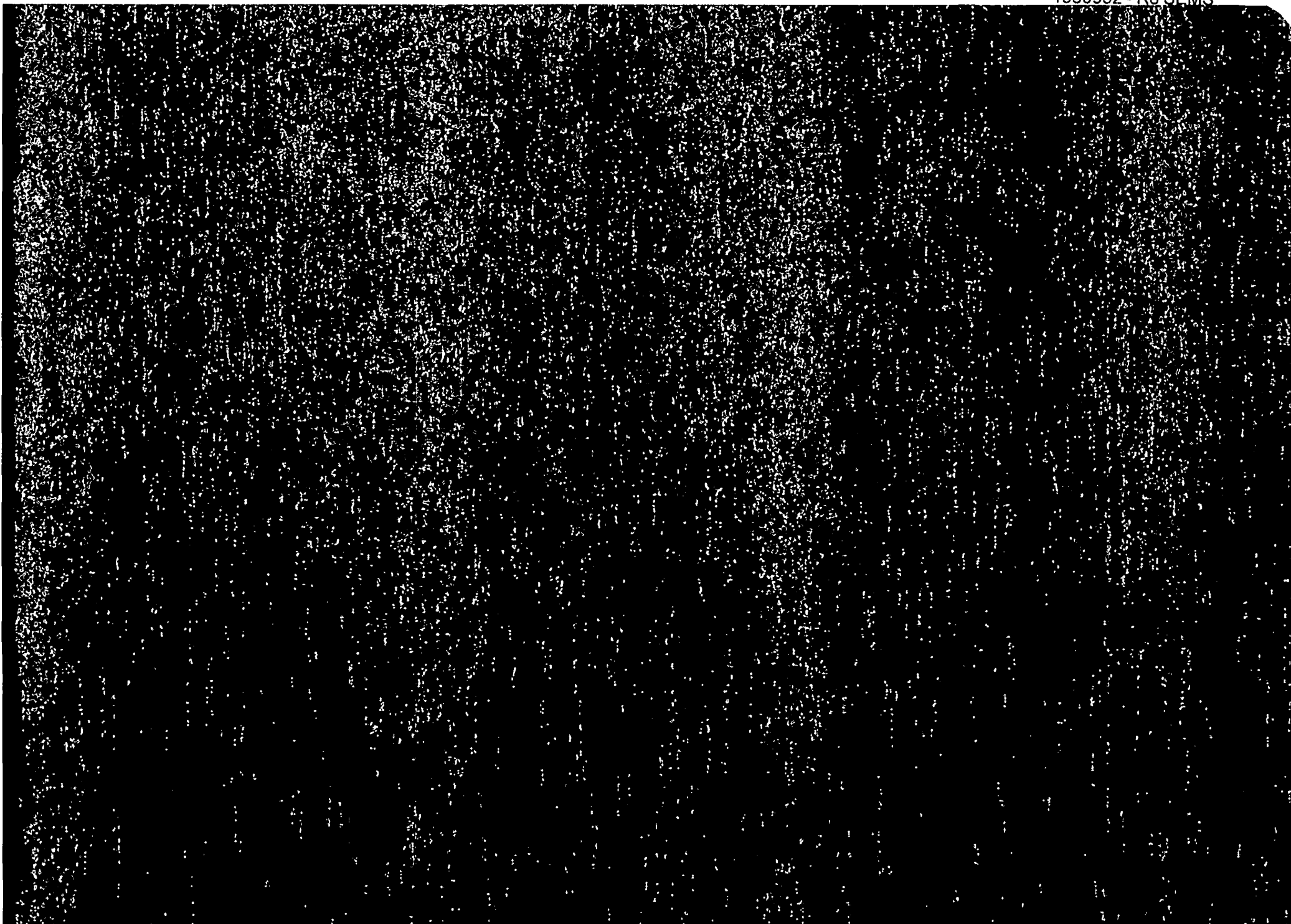




1930562 - R8 SEMS



EXN1-271  
CORRESPONDANCE

SEMS  
1930542



June 1, 1990

Mr. David E. Blackford  
Mr. Paul Mock  
U.S. Department of Agriculture  
U.S. Forest Service  
Nemo Ranger District  
460 Main Street  
Deadwood, South Dakota 57732

Subject: Request for Additional Time to Complete the Approved  
Brohm Exploration - Operating Plan 1988-1989

Gentlemen:

Pursuant to phone conversations with Rod MacLeod and your office, Brohm Mining Company (Brohm) respectfully requests additional time to complete the above referenced project. This would allow an additional three years to complete the approved activities (See Attachment #1). The purpose for this request is to allow Brohm the opportunity to assess the mineral potential of this property, without having to resubmit or duplicate the permitting and environmental review process.

Brohm remains committed to all of the conditions outlined in the October 3, 1988 Decision Notice and its corresponding Appendix "A".

If you have any questions, or wish to discuss this matter in further detail, please contact me at the printed letterhead phone number.

Thank you in advance for expediting this request. I look forward to hearing from you in the near future.

Sincerely,  
Brohm Mining Corporation

A handwritten signature in cursive script that reads 'Lee Pat Gochnour'.

Lee "Pat" Gochnour  
Manager of Environmental Affairs

Attachments:  
LPG/rrl

cc: Tom Durkin (SD DWRN)  
Jim Barron  
Rod MacLeod  
Mike Attaway

South Dakota Office: P.O. Box 485, Deadwood, South Dakota 57732  
Telephone: (605) 578-2107 Telecopier: (605) 578-1709

Brohm Mining Corp. is a wholly owned affiliate of Minven Gold Corporation



United States  
Department of  
Agriculture

Forest Service  
Black Hills  
National  
Forest

Nemo Ranger Dist.  
460 Main Street  
Deadwood, SD 57732

Reply to: 2820

Date: October 3, 1988

John Wilbanks  
Director of Environmental Affairs  
Brohm Mining Corp.  
PO Box 485  
Deadwood, SD 57732

Dear John:

Attached to this letter is the Decision Notice approving your proposed exploration activities subject to the mitigation included as Appendix A.

Approval of this operating plan does not constitute now, or in the future, recognition or certification of the validity of any mining claim to which it may relate, or to the mineral character of the land on which it lies. If you have any questions please feel free to contact Paul Mock at (605) 578-2744.

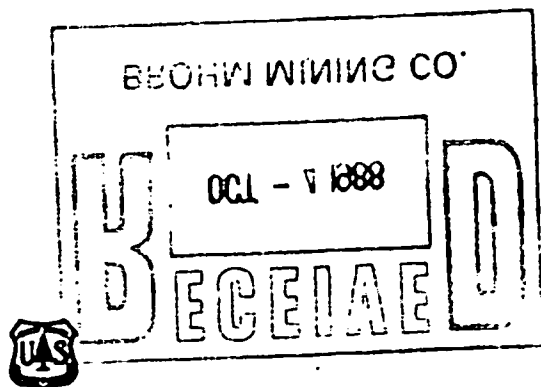
Sincerely,

*David E. Blackford*  
DAVID E. BLACKFORD  
District Ranger

Enclosures

cc: T. Durkin, South Dakota Division of Natural Resources, Pierre, SD  
with copy of Decision Notice

PM: js



DECISION NOTICE  
ENVIRONMENTAL ASSESSMENT  
and  
FINDING OF NO SIGNIFICANT IMPACT  
Brohm Mining - 88-89 Exploration  
Lawrence County, South Dakota  
Nemo Ranger District  
Black Hills National Forest

Brohm Mining Corporation, Deadwood, South Dakota has submitted a Plan of Operations to conduct mineral exploration using portable core and rotary drilling equipment. Brohm proposes to drill a maximum 250 holes, to a maximum depth of 2,000 feet. The exploration will take place on unpatented mineral property, either owned or otherwise controlled by Brohm. These properties are located within a 2 mile radius of their operating Gilt Edge project. The plan calls for utilizing old roads and previously disturbed areas for drill site locations. On those sites requiring new access or site preparation, ground disturbance will be minimized by shifting locations to take advantage of natural openings or areas with more open tree stands.

The proposal to drill 250 holes is the maximum probable over a two year period. Initial drilling on National Forest will take place in and around Anchor Hill and Butcher Gulch. Additional drilling will depend on results obtained from this initial phase. All land included in this proposal is open to mineral location and development.

Additional mitigation identified in the plan includes installing and maintaining erosion control structures in roads, to be kept functional during periods of use and during work shut down periods. Roads, if needed, will be constructed only to a standard needed for this project. All new roads will be obliterated and stabilized following use. Near natural contour will be restored. Rights-of-way will be cleared in advance of construction. Slash or debris from clearing will be piled for later burning or buried. Incidental light slash will be treated by lopping all slash so that it is no greater than 18 inches from the ground. Reclamation bonding of \$20,000 is currently in effect.

Based on the probable environmental consequences it is my decision to approve the plan of operations with the additional mitigation shown in Appendix A attached. A no action alternative was considered but eliminated because the proposed activity is planned for land open to mineral entry, exploration of a similar nature is common practice in this area, and historically mineral development has been important throughout the Black Hills.

This proposal will not cause a significant effect on the quality of human environment, therefore an Environmental Impact Statement will not be prepared. Implementation may take place immediately.

*Amend  
While  
a better  
staty  
that work  
won't be  
done  
that we  
won't  
like to  
extend  
for an  
additional  
2 or 3 years*

My decision is subject to appeal pursuant to 36 CFR 211.18 as revised on Nov. 19, 1986. To initiate an appeal a written notice of appeal must be filed with the District Ranger, 460 Main ST., Deadwood, SD 57732, within 45 days from the date of this decision. A statement of reasons to support the appeal and any request for oral presentation must be submitted within this 45 day filing period.

David E Blackford  
District Ranger  
Nemo District

9/30/88  
Date

APPENDIX A  
Brohm Explorations - Operating Plan 1988-89

1) Specific drill holes and access routes on National Forest will be reviewed on the ground by Brohm and the Forest Service prior to any ground disturbance. At least five day advance notice may be needed for Forest Service on the ground review.

2) Reclamation will follow guidelines approved by the District Ranger using the Best Mineral Management Practices, following will apply on National Forest land.

- 1) Scarify surface if smooth or crusted
- 2) 18 lbs/acre (pure live seed) of the following mixture:

Smoothbrome	8 lbs.
Kentucky Blue	3 lbs.
Timothy	3 lbs.
Orchard Grass	2 lbs.
Alsike Clover	3 lbs.
Yellow Sweet Clover	2 lbs.

3) Water bars will be used on temporary access on other disturbed areas where it is necessary to divert water to reduce erosion. See attached for specifications and design.

4) Drill collars and casing will not extend above ground surface, following completion of drilling.

5) An approved Cultural Resource report will be required before any ground disturbing activity takes place. A Level I survey will be completed for any activity occurring on previously disturbed sites, unless a Level III survey has already been completed.

6) If significant amounts of merchantable timber are cut, Brohm will remove the timber from the National Forest. The Forest Service will mark this timber and prior to its removal, Brohm will pay for the timber at appraised rates established by the Forest Service.

7) Trees to be removed will be cut and not pushed over. Slash created from cut trees will be lopped and scattered so as to lie within 18 inches of the deck.

8) If visible travelways are created through a timber stand after the drill site is abandoned, this travelway will be covered with available slash and/or logs to prevent further use by off road vehicles.

9) In the event fences must be crossed, openings in fences will be temporary and the fence will be returned to the original condition after the drill site is abandoned. Fences must remain effective and openings closed to prevent movement of livestock through the fence.

10) Drilling fluids will be properly disposed of off National Forest land, or buried. Fluids will be prevented from draining from drill pits during drill pit reclamation.

11) Bond amount for reclamation is \$20,000.

12) Use of the Lost Gulch roads for mineral exploration or other purposes will require coordination with the ongoing construction and timber harvest activities. Brohm will be responsible for a proportionate share of road maintenance based on use. This amount will be determined in advance of use, and authorized through a Road Use permit for all roads not on mineral claims covered by this Operating Plan.



## Waterbars

### 1. Purpose

To reduce the velocity of water running down a road or disturbed area and divert that water away from the road or disturbed area.

### 2. Description

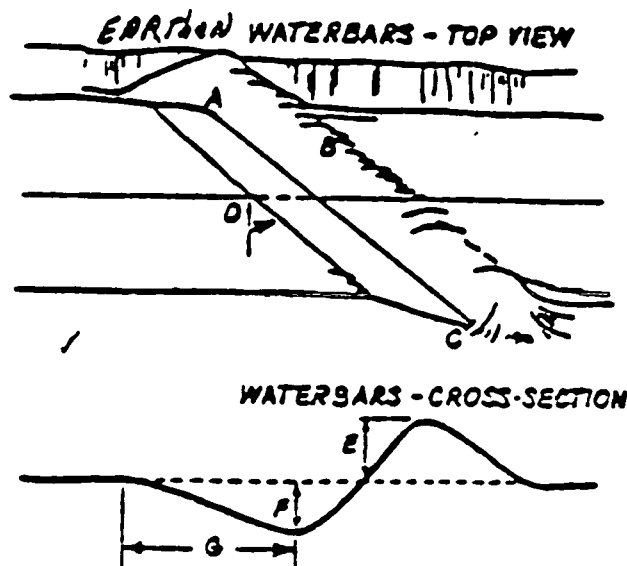
Waterbarring is an effective means of reducing soil erosion from unsurfaced roads, trails, or other disturbed areas. Waterbars reduce runoff velocities if placed at proper intervals and divert runoff away from disturbed sites. Waterbars can be constructed using hand tools or with heavy equipment. The bars can be constructed using soil, rocks, brush, slash logs, or any other material that can intercept runoff and divert the water away from the site to be protected.

### 3. Recommended Action

Waterbars should be keyed into the surface so that the force of running water cannot move the structure or flow through or under it. They should be placed at an angle to the prevailing slope so as not to form a dam and impound water behind the structure. All water should be diverted to an area where additional water will not cause accelerated erosion or pollution. In some situations, diversion sites may have to be reinforced or prepared to accept the additional water. The following chart depicts the recommended waterbar spacing for optimum soil erosion protection.

<u>Grade (%)</u>	<u>Spacing (feet)</u>
2	250
5	135
10	80
15	60
20+	50

### 4. Illustration



A - Tie-in point, key into sideslope if possible.

B - Cross drain berm height 6"-2'.

C - Drain outlet cut--drain into stable area.

Remember energy dissipators, waterspreaders, etc.

D - Angle drain 30 to 45 degrees downgrade with slope contour.

E - Can be 6"-2' in height.

F - Can be 6"-18" in depth.

G - Can be 12"-36" in width.

March 5, 1990

Mr. Rod MacLeod  
Mine Geologist  
Brohm Mining Corporation  
PO Box 485  
Deadwood, SD 57732

Dear Rod:

This correspondence is in follow up to our phone conversation on January 18, 1990 and your letter dated February 6, 1990 regarding the overland flow of drilling fluids at two exploratory drill sites in Hoodoo Gulch.

I was pleased to discuss the site with you and Lance Hubbard, over the phone. The drill sites are under EXNI-271 which prohibits all exploration drilling.

"When drilling fluids contained to the waters of the

As you pointed out, appropriate instructions should be avoided in the

The problem was discussed with you and your superiors and pointed out to Brohm as a possible violation on January 17, 1990 and again by DWNR on January 18, 1990. DWNR is aware of Brohm's quick response to the problem. However, as we discussed on the phone, if a similar problem is detected in the future, DWNR must treat it as a violation.

If you have any questions, please contact me.

Sincerely,

*J.*

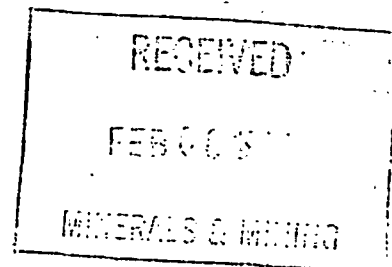
Thomas V. Durkin  
Hydrologist  
Exploration & Mining Program  
Telephone: (605) 773-4201

when I inspected the site and discussed with you and Lance Hubbard, over the phone. The drill sites are under EXNI-271 which prohibits all exploration drilling.

sufficiently large to any

n of mud pits and this problem should

EXNI-271  
Correspondence



February 6, 1990

Mr. Tom Durkin  
Department of Water and Natural Resources  
Joe Foss Building  
523 East Capitol  
Pierre, South Dakota 57501

Dear Mr. Durkin:

While drilling exploration holes on January 18 and 19, 1990, water and drill cuttings mistakenly breached the sump and flowed onto the surrounding ground. There were no drilling additives such as polymers, soap, bentonite, etc. mixed with the water. The cuttings were picked up by January 22, 1990.

We have restated our concern for this situation, and have reviewed once again the proper drilling procedures to appropriate personnel and outside contractors. We would hope that our immediate response to this incident indicates Brohm's genuine desire to operate with proper safeguards to the environment.

Sincerely,  
Brohm Mining Corporation

Rod MacLeod  
Mine Geologist

RM/rrl

# RECORD OF TELEPHONE CONVERSATION

DATE: 4/28/88 TELEPHONE NUMBER: 578-2107

TELEPHONE CALL TO: Tom Durkin

TELEPHONE CALL FROM: Doug Stewart (Brim)

RE: Brim EXND-271

STAFF SIGNATURE DS

NOTES: Brim drilled only 14 of the 200 permitted holes this winter. Pigs will now be brought back & to initiate more drilling & plugging. This notice serves as 48 hr. notification. Drilling & plugging should begin on May 2, 1988 & continue indefinitely. I told Doug that Dale Snyder will soon be moved to Hill & Brim shall inspect hole plugging more frequently.

I told Doug that I am currently writing a letter to EncoTech in response to their sulfide water monitoring plan. Doug said that George Robinson is leaving EncoTech & to address letter ~~to~~ & all correspondence for sulfide project to:

Doug Stewart  
Project Manager - Sulfide Project  
Brim Mining Corp.  
PO Box 485  
Deadwood, SD 57732

# BROHM MINING CORP.

RECEIVED

JAN 28 1988

January 25, 1988

EXPLORATION AND  
MINING PROGRAM

Mr. Tom Durkin  
South Dakota Dept. of Water and Natural Resources  
Joe Foss Building  
523 East Capitol  
Pierre, South Dakota 57501-3181

RE: EXNI-271

Dear Mr. Durkin:

Pursuant to requirement #3 of EXNI-271, Brohm Mining Corporation hereby serves notice of its intent to seal exploration drill hole #R88-366 on or about January 29, 1988. Drilling of this hole will commence January 26, 1988 and we anticipate completion by January 29.

As the drilling program contemplated by Notice of Intent #EXNI-271 gets underway, we anticipate completing and permanently abandoning drill holes at least every two days; in fact, some holes will be started and abandoned in the same 24 hour period. Providing your department with a 48 hour notice prior to completion of each drill hole will be very difficult to schedule. We hereby notify you that from January 26th until about April 15th we will complete and abandon a drill hole approximately once every two days. If you wish to know an exact time, please contact me or Jim Barron, our senior exploration geologist.

Thank you for your consideration of this request.

Sincerely,

*Doug Stewart*

Doug Stewart  
Sulphide Project Manager

DS/dvl

South Dakota Office: P.O. Box 485, Deadwood, South Dakota 57732  
Telephone: (605) 578-2107 Telecopier: (605) 578-1709

Head Office: #1660-999 West Hastings Street, Vancouver, B.C. V6C 2W2  
Telephone: (604) 662-8383 Telex: 04-51472 P V C VCR Telecopier: (604) 684-1329

January 13, 1988

Lawrence County Commissioners  
Lawrence County Courthouse  
Deadwood, SD 57732

RE: Restriction Letters Pertaining to Notice of Intent

Dear Sir:

In accordance with SDCL 45-6C-15, the South Dakota Department of Water and Natural Resources (DWNR) hereby forwards copies of the following materials pertaining to the Notice of Intent filed by Brohm Mining Corporation.

- (X) Department of Game, Fish, and Parks' restrictions pertaining to wildlife matters
- (X) Department of Education and Cultural Affairs' restrictions pertaining to historic and archaeological matters
- (X) DWNR's restrictions pertaining to water rights or water pollution control

Based on materials sent in our correspondence of December 16, 1987 in addition to the ones forwarded today, all of the requirements pertaining to the notification of the County Commissioners have been met. If you have any questions relating to the filing of the Notice of Intent, please contact our office.

Respectfully,

Robert Townsend  
Program Chief  
Exploration and Mining Program  
Telephone: (605) 773-4201

Enclosure: GF&P Restrictions, DECA Restrictions, & DWNR Restrictions

January 13, 1988

Mr. Douglas Stewart  
Sulphide Project Manager  
Brohm Mining Corporation  
P.O. Box 485  
Deadwood, SD 57732

Dear Mr. Stewart:

We are in receipt of the exploration Notice of Intent you filed with our office on December 14, 1987. As a result of our review of the proposed operation, we have determined that the following restrictions are required pertaining to water pollution control:

- 1) All test holes shall be capped, sealed and plugged immediately following the drilling and probing. However, Brohm has indicated its desire to leave holes within the pit areas open. The holes must be temporarily plugged as per SDCL 74:11:08:08. The method for temporary abandonment described in Brohm's December 16, 1987, letter to Department of Water and Natural Resources (DWNR) is sufficient. The temporary plug shall remain in place until mining commences. Any other method must be approved by the Department.

Furthermore, any holes drilled deeper than the final pit depth must be plugged either from the hole bottom to the pit bottom level and temporarily abandoned above that point as described above, or plugged as per ARSD 74:11:08 to depth.

- 2) Drill hole numbers D87-61, 62, 63, and 64 (temporarily plugged under EXNI-258) shall be permanently capped, sealed, and plugged immediately after the holes are deepened and samples taken.
- 3) The operator shall notify the Department of Water and Natural Resources at least 48 hours prior to final hole abandonment so that a representative from the Department can witness the plugging procedure.

# AFFIDAVIT OF PUBLICATION

STATE OF SOUTH DAKOTA, } ss.  
COUNTY OF LAWRENCE

RECEIVED

DEC 29 1987

EXPLORATION AND  
MINING PROGRAM

Jimnie R. Stephenson, of said county and state, being  
duly sworn, on his oath says: That the Lead Daily Call Deadwood Pioneer

is a legal newspaper of general circulation, printed and published in Lead,  
in said county and state, by the Seaton Publishing Company, and has been  
such a newspaper during the times hereinafter mentioned; and that I,

Jimnie R. Stephenson, the undersigned, am the  
Business Manager of the said newspaper, in charge of the advertising  
department thereof, and have personal knowledge of all the facts in this  
affidavit, and that the advertisement headed NOTICE OF FILING  
EXPLORATION NOTICE OF INTENT

a printed copy of which is hereto attached, was printed in said newspaper  
for one successive and consecutive week, the respective publi-

cations thereof being made on December 24, 19 87

and on \_\_\_\_\_, 19 \_\_\_\_\_

\_\_\_\_\_, 19 \_\_\_\_\_

\_\_\_\_\_, 19 \_\_\_\_\_

\_\_\_\_\_, 19 \_\_\_\_\_

\_\_\_\_\_, 19 \_\_\_\_\_

\_\_\_\_\_, 19 \_\_\_\_\_

and the last publication thereof on December 24, 19 87

and that the full amount of fees charged for publishing the same, to-wit:

the sum of \$ 9.74, inures solely to the benefit of aforesaid

publisher and that no arrangement or understanding for a division thereof

has been made with any person other than the publisher, and that no part

thereof has been agreed to be paid to any other person whomsoever.

Subscribed and sworn to before me this 24th

day of December, 19 87

Sina Koll  
Notary Public, Lawrence County, S. Dak.  
My Commission

Expires April 2, 1995

My commission expires \_\_\_\_\_, 19 \_\_\_\_\_

## NOTICE OF FILING EXPLORATION NOTICE OF INTENT

Notice is hereby given that the  
South Dakota Department of Water  
and Natural Resources has received a  
Notice of Intent to conduct gold  
exploration from Brohm Mining  
Corporation, P.O. Box 485,  
Deadwood, South Dakota 55732. The  
resident agent for the operator is C.T.  
Corporation System, 319 South  
Coteau Street, Pierre, South Dakota  
57501.

The exploration project site is  
generally located at the Gilt Edge  
Mine area, approximately 4 miles east  
of Lead in Section 5-8; T4N-R4E in  
Lawrence County.

Operations are anticipated to begin  
in January, 1988. The exploration will  
consist of drilling up to 200 rotary  
and/or diamond drill holes on 50 to  
1,000 foot centers to a maximum  
depth of 2,000 feet to conduct  
condemnation drilling on areas that  
may be used for future mine facilities  
and to delineate deeper gold  
mineralization. No new roads will be  
constructed.

Persons desiring further  
information may contact the South  
Dakota Department of Water and  
Natural Resources, Exploration and  
Mining Program, Joe Foss Building,  
Fourth Floor, Pierre, South Dakota  
57501 - (605) 773-4201.

Dec 24



December 17, 1987

Mr. Doug Stewart  
Sulfide Project Manager  
Brohm Mining Corp.  
P.O. Box 485  
Deadwood, South Dakota 57732

Dear Mr. Stewart:

This correspondence is in response to our phone conversation of December 14, 1987, regarding Brohm's latest exploration notice of Intent (EXMI).

All test holes in the pit areas that are to be drilled to depths that exceed the final pit depth must be adequately plugged. As per SDCL 45-6C-28, Brohm must apply, in writing, to the Department of Water and Natural Resources (DWR) for permission to temporarily keep a test hole open. If Brohm wishes to do this, please include test hole information (i.e., hole location and depth, hydrologic conditions encountered, formations encountered, period which hole will be temporarily plugged, and any other pertinent information).

Part 3 of the reclamation plan states that all roads no longer needed for exploration and mining activities will be reclaimed, closed to traffic, and re-seeded. This gives the impression that traffic could access these roads if they were not closed. Please be aware that for final bond release, roads in steep areas must have the toe fill pulled back up onto the road cut in order to RESTORE (as per SDCL 45-6C-32) the affected land as nearly as possible to its original condition.

As you requested, I shall notify the other agencies, (DECA, SCS, GF&P) of Brohm's proposed exploration.

I'll see you at our scheduled field inspection at noon on January 4. If you have any questions, please don't hesitate to contact me.

Sincerely,

Thomas V. Durkin  
Hydrologist  
Exploration and Mining Program  
Phone: (605) 773-4201

dd1701td.sm

December 16, 1987

Lawrence County Commissioners  
Lawrence County Courthouse  
Deadwood, SD 57732

RE: Pending Mineral Exploration Notice of Intent

Dear Sir:

In accordance with SDCL 45-6C-15, the South Dakota Department of Water and Natural Resources (DWNR) hereby forwards a copy of the Notice of Intent submitted by Brohm Mining Corporation.

Enclosed please find the major documents pertaining to this filing. The following checked items, however, have not yet been received by our office; copies of these will be forwarded once we receive them:

- (X) Department of Game, Fish, and Parks' restrictions pertaining to wildlife matters
- (X) Department of Education and Cultural Affairs' restrictions pertaining to historic and archaeological matters
- (X) DWNR's restrictions pertaining to water rights and water pollution control

You should be receiving these additional materials within the next 30 days. Please note that we have not enclosed a copy of the map or the recommendations of the Conservation District. The map is considered confidential. If the recommendations of the Conservation District are desired, they can be requested from either our office or the County Conservation District. If you have any questions relating to the filing of this Notice of Intent, please contact our office.

Respectfully,

Robert Townsend  
Program Chief  
Exploration and Mining Program  
Telephone: (605) 773-4201  
Enclosures: Notice of Intent, Reclamation Plan, documents stated above

December 16, 1987

Lead Daily Call  
P.O. Box 876  
Lead, SD 57754

RE: BROHM MINING CORPORATION

Dear Editor:

Please publish the enclosed notice in your paper as "legal notice" for one issue on **December 24, 1987**. If for any reason you are unable to publish this notice on the date specified, please immediately notify the Exploration and Mining Program office at 773-4201.

After publication, submit a statement of billing for publishing the enclosed notice along with an affidavit of publication. Your statement should show a cost breakdown (cost per column inch). We request that you return the affidavit and statement of billing by December 31, 1987. Your billing should be sent to the following address:

Department of Water and Natural Resources  
Fiscal Office  
Joe Foss Building, Room 213  
523 East Capitol  
Pierre, SD 57501

Respectfully,

Robert Townsend  
Program Chief  
Exploration and Mining Program  
Telephone: (605) 773-4201

Enclosure: Notice of Filing Exploration Notice of Intent

NOTICE OF FILING  
EXPLORATION NOTICE OF INTENT

Notice is hereby given that the South Dakota Department of Water and Natural Resources has received a Notice of Intent to conduct gold exploration from Brohm Mining Corporation, P.O. Box 485, Deadwood, South Dakota 57732. The resident agent for the operator is C.T. Corporation System, 319 South Coteau Street, Pierre, South Dakota 57501.

The exploration project site is generally located at the Gilt Edge Mine area, approximately 4 miles east of Lead in Sections 5-8; T4N-R4E in Lawrence County.

Operations are anticipated to begin in January, 1988. The exploration will consist of drilling up to 200 rotary and/or diamond drill holes on 50 to 1,000 foot centers to a maximum depth of 2,000 feet to conduct condemnation drilling on areas that may be used for future mine facilities and to delineate deeper gold mineralization. No new roads will be constructed.

Persons desiring further information may contact the South Dakota Department of Water and Natural Resources, Exploration and Mining Program, Joe Foss Building, Fourth Floor, Pierre, South Dakota 57501 - (605) 773-4201.

# RECORD OF TELEPHONE CONVERSATION

DATE: 12/14/87 TELEPHONE NUMBER: 578-2167

TELEPHONE CALL TO: Gary Stewart

TELEPHONE CALL FROM: Tom Durkin

RE: Boston EX-1

STAFF SIGNATURE Thomas H. Durkin

NOTES: I informed Mr. Stewart of the deficiencies regarding the EX-1:

- In site plan (1-A) it is stated that all holes will be plugged. I pointed out that in site plan 1-A, we put holes will be plugged. I said that temporary plugging must be requested as required by D.C. (see site plan #4)
- Site plan (#3) gives the impression that excavation work will be ~~not~~ required, not required. It says they will be closed to traffic & sealed. I informed Mr. Stewart that for final he should have excavation work in deep hole areas must be "retired" (the full depth of hole must be to the same or near original contours). He agreed.
- DECA, SCS, GEP have not been notified. Gary requested me to do so. I will send WOT, new map, site plan today.
- D.C. requires that drill hole locations be outlined (circled on map where they are within quarter quarter section) so that a determination can be made regarding the need for a pre-inspection of field area. He will telephone me today.

(I sent a letter regarding the comments to Mr. Stewart)

# BROHM MINING CORP.

December 8, 1987

RECEIVED  
DEC 11 1987

EXPLORATION AND  
MINING PROJECT

Mr. Tom Durkin  
Dept. of Water and Natural Resources  
Exploration Mining Program  
Joe Foss Building, Fourth Floor  
Pierre, SD 57501

RE: Notice of Intent to Conduct Mineral Exploration

Dear Mr. Durkin:

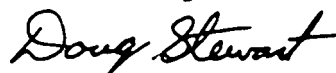
The attached Notice of Intent is submitted to cover a drilling program that will be conducted from existing roads at Gilt Edge. Brohm would like to begin, as soon as possible, this drilling program to delineate deeper gold mineralization at the Gilt Edge Property and to conduct condemnation drilling on areas of the property that will later be used for surface facilities during mine development and operation. All drill holes will be on private property owned or controlled by Brohm and, for this Notice of Intent, no drilling or other surface disturbance will occur on any Forest Service lands.

All drill holes and drill sites, except for those that will be in areas where mining development is planned in the near future, will be plugged and reclaimed in accordance with ARSD 74:11:08. Those drill holes located within future mine development areas will be capped in accordance with the July 24 letter from Robert Townsend which authorized Notice of Intent #EXNI-258.

In a recent conversation between Tom Durkin of DWNR and Wally Robison of Minproc, Mr. Robison mentioned that this Notice of Intent may include plans to construct new drill roads. Although Brohm ultimately plans to construct new drill roads, the locations of these roads are not yet determined and, in the interests of expediency, we are submitting this Notice of Intent for drill sites on existing roads only. When the locations of the new drill roads have been determined, Brohm will submit a new Notice of Intent.

If you have any questions regarding this letter or the attached forms, please call me at (605) 578-2107.

Sincerely,



Doug Stewart  
Sulphide Project Manager

DS/dvl

Attachments:

South Dakota Office: P.O. Box 485, Deadwood, South Dakota 57732  
Telephone: (605) 578-2107

Head Office: #1580 - 999 West Hastings Street, Vancouver, B.C. V6C 2W2  
Telephone: (604) 662-8383 Telex: 04-51472 P V C VCR Telecopier: (604) 664-1329

EXNI - 271  
NOTICE OF INTENT

SEM 2  
1930542



## CHECKLIST FOR EXPLORATION NOTICE OF INTENT

EXNI - 271

NOI

1. Operator Name: Braham Mining Corp.  
45-6C-7(1)
2. Operator Address: PO Box 485  
45-6C-7(2) Deadwood, SD 57732
3. Phone Number: 578-2107
4. Resident Agent: CT Corp.  
45-6C-7(3)
5. Resident Agent's Address: 319 S. Coteau St.  
Pierre, SD 57501
6. Resident Agent's Phone Number: 224-5826
7. Confirmation with Secretary of State: Date: 12/14/87 By: T.P.
8. Authorization Letter for Permit Agent Received: \_\_\_\_\_
9. Type of Exploration: 200 rotary +/- diamond drill holes on 50 to 1000 ft. centers will be  
45-6C-7(5) drilled to a max. of 2000 feet. The new roads will be constructed.
10. Minerals to be Explored: Gold.  
45-6C-7(5)
11. Legal Description of Permit Area: sect. 5, 6, N1/2, N1/2, T4N-R4E.  
45-6C-7(6)
12. Affected County(ies): Lawrence  
45-6C-7(6)
13. Complete Notice Form Received (Date): 12/9/87  
45-6C-6(1) and 45-6C-7
14. Complete Reclamation Plan Form Received (Date): 12/9/87  
45-6C-6(2) and 45-6C-8

15. Topographic Map Showing Water Sources and Hole Locations Received (Date):  
45-6C-6(3) and 45-6C-9

12/14/87

16. \$250 Fee Received (Date):  
45-6C-6(4) and 45-6C-17

12/9/87

17. Surety Bond Received (Date/Amount/Bond No./Bonding Company/Is Permit to be Covered Under Another Bond):  
45-6C-19 and 45-6C-20

\$20,000 #32407 Northwest Bank SD, N.A. (Covered Under EXN15-191)

18. Pre-Inspection of Permit Area (Date/Inspector):  
45-6C-19

19. Alternative Written Landowner Preferences (Date):  
45-6C-16

20. Copy of Approved USFS Operating Plan (Date):

Summary:

21. GF&P Notification (Date):  
45-6C-10

12/14/87

Response (Date):  
45-6C-10

1/7/88

GF&P Restrictions:  
45-6C-10

22. DECA Notification (Date):  
45-6C-11

12/14/87

Response (Date):  
45-6C-11

1/7/88

DECA Restrictions:  
45-6C-11

23. Conservation District(s) Notification (Date):  
45-6C-8

12/14/87

Response (Date):  
45-6C-8

1/26/87

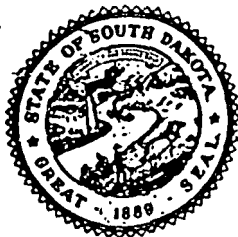
Summary:  
45-6C-8

Handwritten signature

24. DWR Hydro Memo:

25. DWR Restrictions:  
45-6C-12

26. Newspaper Used for Advertisement: Lead Daily Call  
45-6C-15  
Date Sent: 12/16/87 Date Published: 12/24/87 Affidavit Received: 12/29/87  
45-6C-15 45-6C-15 45-6C-15
27. Copy of Ad to Fred Steece: 12/16/87
28. Filing of EXNI and Restrictions with County Commissioners:  
45-6C-15  
Initial Letter: 12/16/87  
45-6C-15  
Final Letter: 1/13/88  
45-6C-15
29. DWNR Restriction Letter Sent to Operator (Date): 1/13/88  
45-6C-12
30. Copy of DWNR Restriction Letter to Crew (Date): 1/13/88
31. Copy of DWNR Restriction Letter to Permit Agent (Date):
32. Copy of DWNR Restriction Letter to US Forest Service (Date):
33. Field File Made (Date): 12/11/87



Department of Water and Natural Resources  
Exploration and Mining Program  
Joe Foss Building, Fourth Floor  
Pierre, South Dakota 57501  
Telephone: 605/773-4201

NOTICE OF INTENT TO CONDUCT  
MINERAL EXPLORATION OPERATION  
(Excluding Uranium)

Pursuant to SDCL 45-6C:  
Relating to the Regulation of  
Mineral Exploration

DEC 9 1987

EXPLORATION AND

Name of Operator and Address of Operator's  
Principle Place of Business:

Brohm Mining Corporation  
Gilt Edge Inc.  
P.O. Box 485  
Deadwood, South Dakota 57732

Telephone Number:

(605) 578-2107

Name and Address of Operator's Resident Agent  
in South Dakota for Service of Process:

CT Corp.  
319 South Coteau St.  
Pierre, South Dakota 57501

Telephone Number:

(605) 224-5826

Brief Description of the Type of Exploration to be Conducted (include a list of all minerals  
to be explored and a description of methods):

Intent is to drill up to 200 rotary and/or diamond drill holes on 50 to 1000 foot centers  
to a maximum depth of 2000 feet. The purpose of this drilling is to delineate deeper gold  
mineralization and to conduct condemnation drilling on areas that may be used for future  
mine facilities. All drilling will be conducted on Brohm controlled lands from existing  
roads and trails. Any drill water that may be required will be appropriated under Brohm's  
Permit Nos. 1324-1 and 1345-1.

Will the Operator Conduct Uranium Explora-  
tion? ( ) Yes (X) No

If Yes, a Permit Pursuant to SDCL 45-6D  
Must be Obtained.

Date Exploration Will Commence:

As soon as this Notice of Intent is approved.

Legal Description of Land to be Explored by  
Section, Township, and Range:

T4N, R4E SDM  
Section 5  
Section 6  
N  $\frac{1}{2}$  Section 7  
N  $\frac{1}{2}$  Section 8

County(s) Affected:

Lawrence

What Legal Authority Does the Operator Have to Conduct Exploration on the Above-Described Land?

(X) Deed (X) Lease ( ) US Forest Service Permit ( ) Other

Attach Copy (Numerous Documents) Furnished Upon Request.

INSTRUCTIONS (Reference SDCL 45-6C):

This Notice of Intent Must be Accompanied by:

1. A Plan of Reclamation Pursuant to Section 8.
2. A Topographic Map Pursuant to Section 9.
3. A Fee of \$250.00 Pursuant to Section 17.
4. A Surety Bond in an Amount to be Determined by the Department Pursuant to Section 19.
5. Any Written Landowner Consultations Giving Alternative Preferences for the Reclamation of the Affected Land Pursuant to Section 16.

Applicant hereby affirms that the mineral exploration will be conducted pursuant and subject to the provisions of SDCL 45-6C, and all regulations promulgated thereunder, that he will grant access to the Board of Minerals and Environment or its agents to the area under notice from the date of the notice and thereafter for such a time to assure compliance with the provisions of SDCL 45-6C.

Signature: Doug Stewart

Title: Sulphide Project Manager Date: 12-08-87

STATE OF SOUTH DAKOTA

COUNTY OF LAWRENCE

On this 8th day of December, 1987, before me personally appeared

Douglas Stewart who acknowledged himself to be the Sulphide Project Manager  
(Title)  
for Brohm Mining Corp., Gilt Edge Proj. and that he is authorized to execute this Notice for  
(Operator)  
the purposes contained therein.

Deborah L. VanderLaan  
Notary Public

Deborah L. VanderLaan

My Commission Expires: July 14, 1995

SEAL

FOR DEPARTMENT USE ONLY

Date Approved:

January 13, 1988

Bond Amount:

#3407  
\$20,000

File Number:

EXNI-271

Exploration Notice of Intent, EXNI- 271, is covered under CD No. 3407, NORWEST BANK SOUTH DAKOTA, N.A., in the amount of \$20,000, provided for EXNI-191.

EXNI- 271 consists of:

Section 5, Section 6, N½ Section 7, N½ Section 8; T4N-R4E, Lawrence County

# RECEIPT

Date Dec 11 1987 No. 037148

Received From Brosnan Mining

Address Blackwood 50

two hundred fifty Dollars \$ 250.00

For new police of street evidence

ACCOUNT		HOW PAID	
AMT. OF ACCOUNT		CASH	
AMT. PAID	<u>250</u>	CHECK	<u>4</u>
BALANCE DUE		MONEY ORDER	

QUNR

By Cindy Cowden

EX N1 - 271  
RECLAMATION PLAN

SEMS  
1980542



EXNI-271

Reclamation Plan

December 31, 1987

MEMO TO: Bob Townsend, Program Chief  
FROM: Tom Durkin, Hydrologist T.D.  
SUBJECT: Brohm Mining Corp EXNI - 271

#### INTRODUCTION:

Brohm Mining Corp. proposes to conduct gold exploration and condemnation drilling within Section 5-8, T4N-R4E of Lawrence County. Exploration will consist of drilling a maximum of 200 rotary and/or diamond drill holes on 50 to 1,000 foot centers to a maximum depth of 2,000 feet. No new access roads will be constructed.

Several of the proposed holes have been previously drilled under EXNI-258 to a depth of 600 feet (the maximum allowable depth specified by Brohm in EXNI-258). These holes will be deepened to 2,000 feet to gain further knowledge of Brohm's sulfide deposit.

The EXNI-258 hydro memo is attached at the end of this report and covers nearly the same area as is currently proposed. The following is additional information pertaining to the newly proposed exploration.

#### GEOLOGY (after DeWitt, et.al., 1986):

see EXNI-258

#### HYDROLOGY:

##### Surface water:

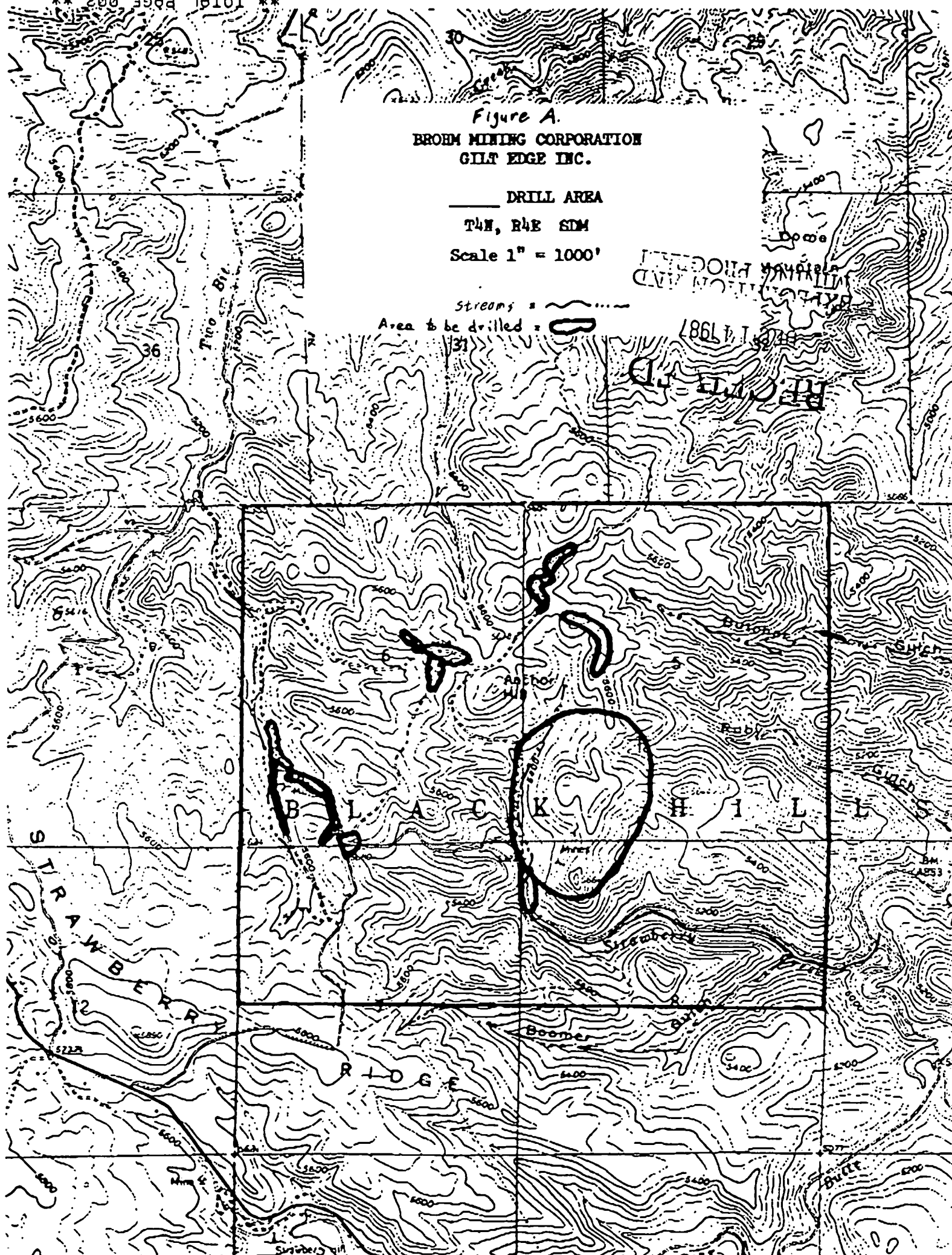
Figure A depicts the surface waters at and within 1/4 mile of proposed exploration.

The proposed exploration area is drained by classified Strawberry Creek and an unclassified tributary to it; Boomer Gulch Creek. Other unclassified drainages include Ruby Gulch Creek, and Butcher Gulch Creek (both tributaries of Bear Butte Creek) and two unnamed ephemeral tributations of Two Bit Creek. For a description of water quality and stream classification see EXNI-258. Additional water quality information follows:

Figure A.  
BROHM MINING CORPORATION  
GILT EDGE INC.

DRILL AREA  
T4N, R4E 5DM  
Scale 1" = 1000'

Streams = ~~~~~  
Area to be drilled = [Outline]



Brohm has established 6 surface water monitoring stations (SW-1 through SW-6) on Strawberry and Bear Butte Creeks (see Figure B). Table 1 depicts the results from the August 28, 1987 sampling. Values circled in blue exceed certain water supply standards (i.e., domestic water supply criteria, cold water permanent and marginal fish life propagation criteria, and/or irrigation water criteria). Parameters in excess of standards at SW-2 were sulfate, pH, conductivity, TDS; arsenic, cadmium, and nitrogen (ammonia). The domestic water supply standard for mercury was reached at SW-4. Nitrogen as ammonia was in excess of certain fish life propagation standards at all surface water stations.

Flow ranged from 0.016 cfs at station SW-2 on Strawberry Creek to 2.05 cfs at station SW-5 on Bear Butte Creek on August 27, 1987. No data was given for SW-1 on upper Strawberry Creek, thus, I assume there was no flow.

Groundwater (after Meyer, 1984, Rahn, 1981, and Brohm water quality report, 1987):

Brohm has installed 5 groundwater monitoring wells along Strawberry Creek in the Precambrian, Deadwood, and Allival aquifers (see Figure B.)

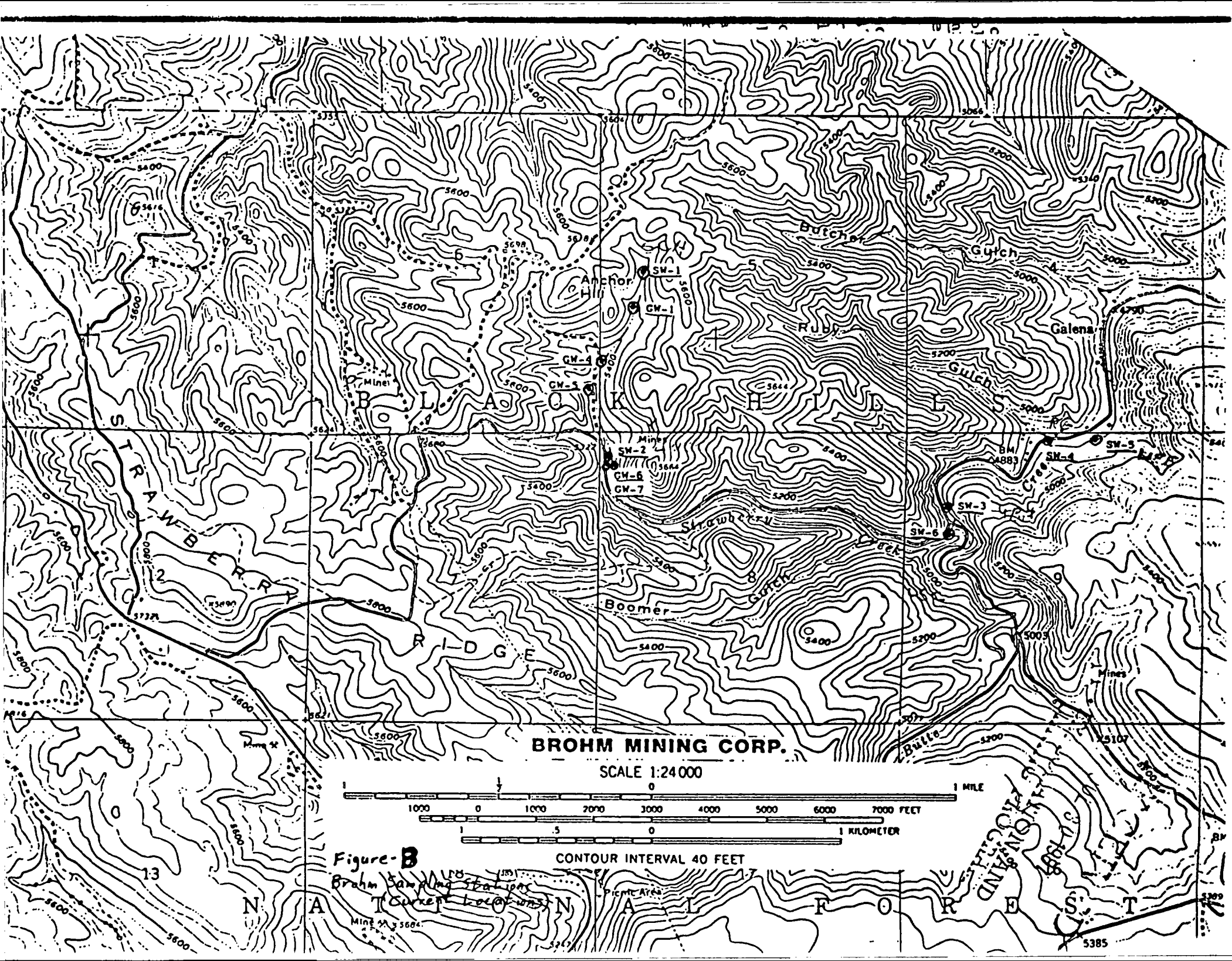
Precambrian aquifer: The Tertiary Igneous Intrusives and Precambrian metamorphic rocks at the proposed exploration area are fractured and weathered. Water infiltrates these fractures and forms localized aquifers. Below depths of 200-500 feet, groundwater may be lacking due to lithostatic pressure closing aquifer fractures. The total porosity is assumed to be 3 percent with an effective porosity of 1 percent. The Precambrian aquifer is potentially vulnerable to contamination due to its highly fractured nature. Abandoned mine workings often contribute elevated levels of trace elements due to acid mine drainage, however, groundwater quality is usually excellent from the crystalline rocks.

Brohm's groundwater monitoring station GW-6 is completed in the Precambrian aquifer. There were no parameters in excess of water quality standards from the August 27, 1987 sampling (see figure B and Table 1)

Deadwood aquifer: The water quality from this aquifer is difficult to assess due to a lack of data. The Deadwood is not very permeable and is overlain by more productive aquifers. The limited data indicate generally good water quality in the vicinity of the Black Hills with deteriorating quality away from them.

Monitoring wells GW-1, GW-4, and GW-5 are completed in the Deadwood.

The drinking water standard for mercury was reached at GW-1 and exceeded at GW-4. pH was low in GW-5 (see Table 1).



Red River aquifer: Is composed of the Winnipeg, Whitewood, and Englewood Formations and contains shales, dolomites, and limestones. It has total porosity of about 20%. Water quality data is sparse for this aquifer.

White River aquifer: No groundwater data was located for the White River aquifer in the Black Hills area.

Alluvial aquifer: Alluvial aquifers which overlie the Precambrian rocks of the Black Hills are often composed of coarse gravels and frequently have excellent water quality. This aquifer is limited in extent over the proposed exploration area. The Quaternary alluvium does not show up on the geologic map.

Brohm has completed groundwater monitoring well GW-7 in the alluvial aquifer (see figure B). On August 27, 1987, pH was quite low (3.19) and water quality standards were exceeded for sulfate, TDS, and cadmium (see Table 1). Contamination is probably from old tailings.

Water quality suitability parameters for each of the above aquifers are given in Appendix 1.

Water Rights has records of 13 wells constructed within 1/2 mile of the proposed exploration area. See EXN1-258 for drillers logs of some of these wells. The remainder of the well logs could not be reproduced due to microfiche reproduction equipment breakdown. However, depths range from 40-350 feet, static water levels ranged from 3-240 feet, and yields ranged from 1.5-16 gpm.

#### COMMENTS AND RECOMMENDATIONS:

1. Underground workings will probably be intercepted. Alternative plugging procedures should be specified.
2. Drill hole numbers D87-61, 62, 63, and 64 (EXN1-258) were drilled to 600 feet and approved by DWNr to be temporarily plugged. Static water level in these holes is at 200 feet. After the holes are deepened to 2,000 feet they should be plugged immediately.
3. The exploration area outlined in Figure A, northeast of Anchor Hill, should be carefully field checked during the pre-inspection for adequate existing access routes (the application calls for no new road construction).
4. Exploration areas west of Anchor Hill have not been field checked under any of Brohm's other EXN1's. Special attention should be given these areas also, during the pre-inspection.

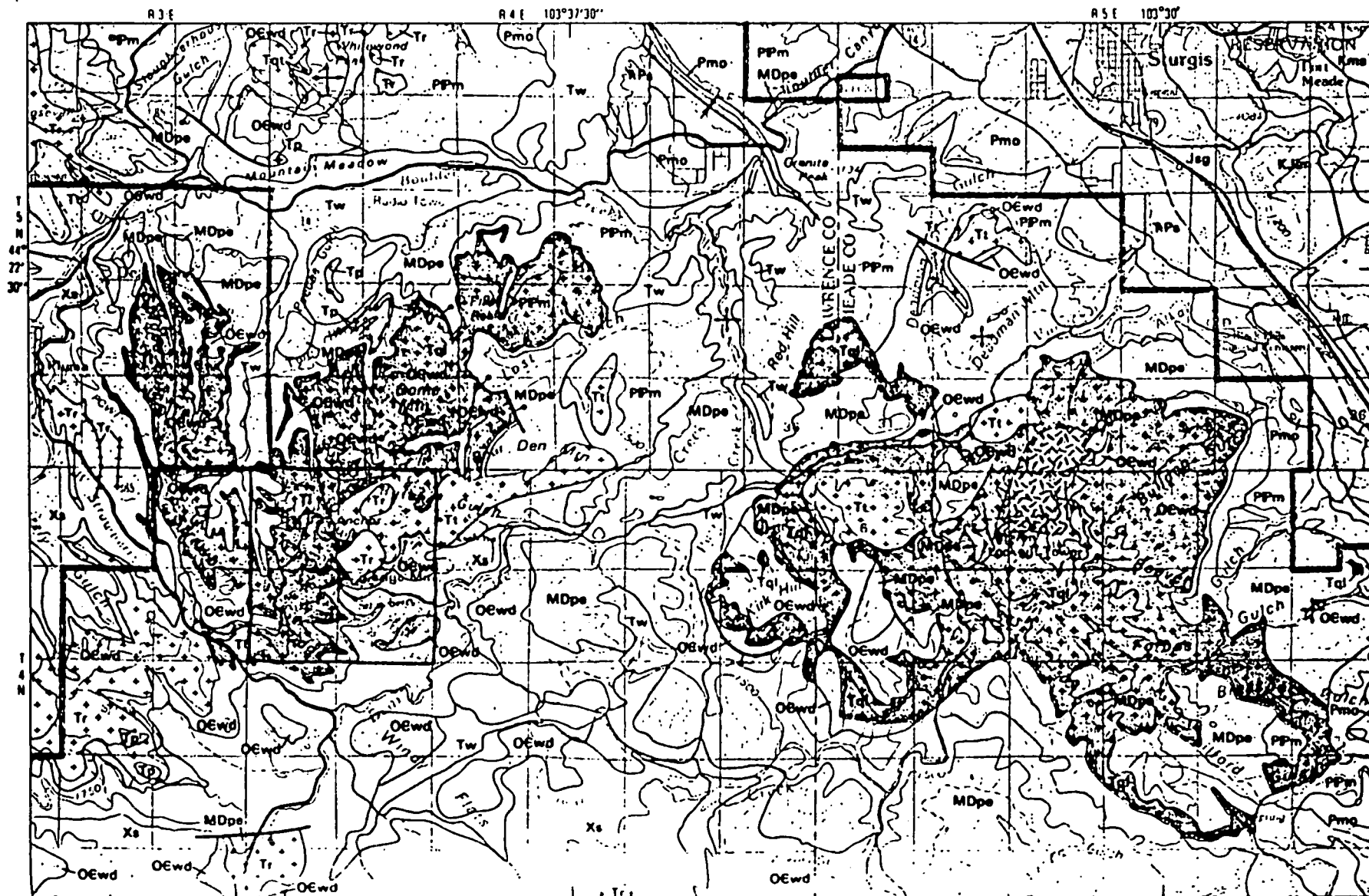


Figure 2. Geology of Exploration Area (DeWitt et al, 1976)

# EXPLANATION

<b>Tw</b>	White River Group (Oligocene)—Tuffaceous claystone and clay containing minor limestone lenses	<b>TPa</b>	Spearfish Formation (Triassic and Permian)—Shale, siltstone, and gypsum
<b>Ph-Tp</b>	Phonolite (Eocene and Paleocene)—Sills, laccoliths, and dikes of analcime-rich phonolite	<b>Pmo</b>	Minnekahta Limestone and Opeche Shale (Lower Permian)—Minnekahta Limestone: slabby limestone. Opeche Shale: sandy shale
<b>Ph-Tr</b>	Rhyolite (Eocene and Paleocene)—Dikes, plugs, sills, and laccoliths of quartz-rich rhyolite	<b>PPm</b>	Minnelusa Formation (Lower Permian and Pennsylvanian)—Sandstone, solution breccia (anhydrite in subsurface), limestone, and shale
<b>Tqt</b>	Quartz trachyte (Eocene and Paleocene)—Sills, laccoliths, and dikes of quartz trachyte	<b>MDpe</b>	Pahasapa Limestone (Lower Mississippian) and Englewood Formation (Lower Mississippian and Upper Devonian)—Pahasapa Limestone: cavernous dolomitic limestone. Englewood Formation: dolomitic limestone
<b>Tqt</b>	Quartz latite(?) (Eocene and Paleocene)—Sills and laccoliths of hornblende quartz latite(?) and biotite quartz latite(?). Pattern indicates area containing hydrothermally altered material. Large body in eastern part of map area is Vanocker laccolith	<b>OGwd</b>	Whitewood Dolomite (Upper Ordovician), Winnipeg Formation (Middle Ordovician), and Deadwood Formation (Lower Ordovician and Upper Cambrian)—Whitewood Dolomite: dolomite. Winnipeg Formation: shale and siltstone. Deadwood Formation: sandstone, shale, and limestone
<b>TL</b>	Latite (Eocene and Paleocene)—Sills of hornblende latite		Metasedimentary and metavolcanic rocks (Early Proterozoic)—Undivided Ellison Formation, Flag Rock Formation, Grizzly Formation, and unnamed age-equivalent strata
<b>Tr</b>	Trachyte(?) (Eocene and Paleocene)—Sills, dikes, and plugs of trachyte and trachyte porphyry		<i>Boundary of proposed exploration area</i>
<b>Kms</b>	Mowry Shale, Newcastle Sandstone, and Skull Creek Shale (Lower Cretaceous)—Mowry Shale: siliceous shale containing thin bentonite layers. Newcastle Sandstone: sandstone and siltstone containing beds of bentonite and lignite. Skull Creek Shale: black shale		Contact—Dashed where approximately located
<b>KJlm</b>	Inyan Kara Group (Lower Cretaceous) and Morrison Formation (Upper Jurassic) Inyan Kara Group—Fall River Sandstone: sandstone and minor siltstone. Lakota Formation: claystone and sandstone containing locally interbedded limestone and lignite lenses Morrison Formation—Siliceous claystone and shale		Fault—Bar and ball on downthrown side
<b>Jsg</b>	Sundance Formation (Upper and Middle Jurassic) and Gypsum Spring Formation (Middle Jurassic)—Sundance Formation: glauconitic sandstone and shale. Gypsum Spring Formation: massive gypsum and minor claystone		Syncline—Axis dotted where concealed
			Dome

Figure 13. Geologic map of the Galena area, Black Hills National Forest, S. Dak. Geology from Darton and Paige (1925), Beck (1976), Matthews (1979), Anna (1973), Rockey (1974), Gasser (1981), G. M. French (unpub. mapping, 1984), Mukherjee (1968), Boyd (1975), Bayley (1972a), and Lisenbee (1985). Base from U.S. Geological Survey, Rapid City, 1977.

## Cenozoic Rocks:

### White River Group (Oligocene):

The White River Group is composed of light-colored clays with sandstone channel fillings and local limestone lenses. Thickness ranges between 0 and 800 feet.

## Old Mine Sites:

The proposed area of exploration is located in the Galena Mining District. Extensive old mine workings exist throughout the area. According to Shapiro and Gries (1970), six gold mines were operated in the four sections covered under this EXN. They are: Anchor Mountain, Gilt Edge, Golden Crest, Hoodoo-Union Hill Group, Oro Fino, and Rattlesnake Jack.

Due to the presence of numerous shafts, gloryholes, adits and drifts in this area, the likelihood of intersecting underground workings during drilling is high. Specific hole-plugging procedures for this event should be specified by the operator.

## SURFACE WATER:

One classified stream and three unclassified streams drain the area to be affected by this proposed exploration program. The classified stream is Strawberry Creek, and the unclassified streams are: Butcher Gulch Creek, Ruby Gulch Creek, and Boomer Gulch Creek.

### Strawberry Creek:

Strawberry Creek is classified for beneficial uses from its confluence with Bear Butte Creek to S5, T4N-R4E as:

- (3) Coldwater marginal fish life propagation waters;
- (8) Limited contact recreation waters;
- (9) Wildlife propagation and stock watering waters; and
- (10) Irrigation waters.

During the period of June 1984 to October 1985 Gilt Edge Inc. conducted water quality monitoring in the area of proposed exploration. Sites one and two were located on Strawberry Creek (Figure 3). Water quality at site 1 on upper Strawberry Creek was good. The pH was between 6.9 and 7.2, TDS was very low or below the limit of detection. The water quality at site 2 was dramatically lower than that of site 1. Total dissolved solids were measured at 394 mg/l, pH at 3.10, and arsenic at 0.28 mg/l (DWSC limit 0.05 mg/l). Other heavy metal concentrations including antimony, copper, lead, zinc, and mercury were also elevated over upstream levels (see appendix).



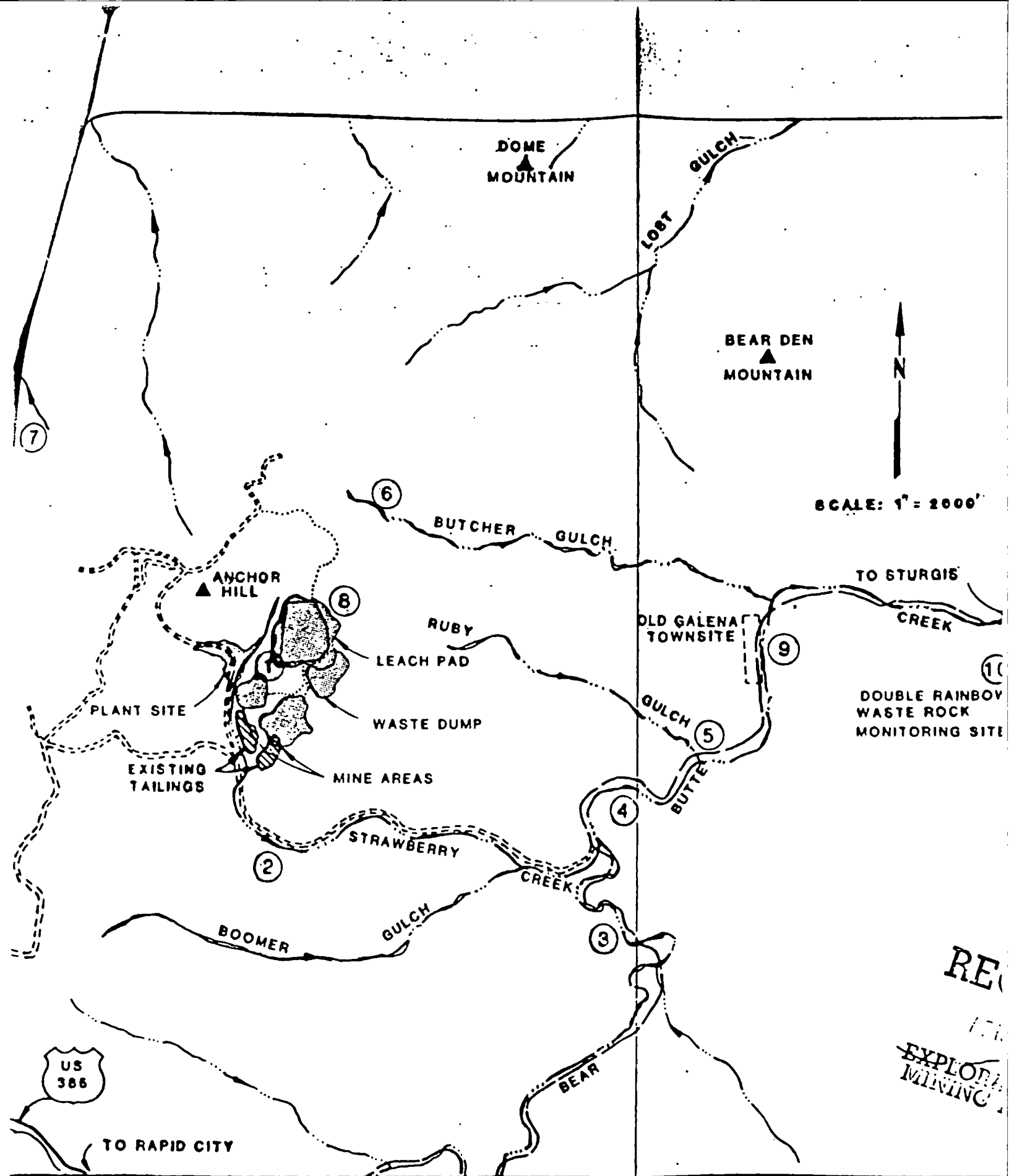


Figure 3. surface Water Monitoring Stations  
 ① - station locations

INITIAL WATER QUALITY  
 MONITORING SITE  
 GILT EDGE MINE PROJECT  
 FIGURE 1

The decrease in water quality between sites 1 and 2 is most likely due to the presence of old mine tailings located along a 1000 foot reach of Strawberry Creek just upstream of site 2. According to the Gilt Edge Project Surface Water Quality Monitoring Program report on file at DWNR, the tailings are being eroded directly into Strawberry Creek. The possibility of a cleanup of these tailings by Gilt Edge Inc. should be examined by DWNR.

Strawberry Creek drains an area of approximately 3 mi<sup>2</sup>, and is approximately 2 mi long, no discharge data was located.

#### Butcher Gulch Creek:

Butcher Gulch Creek is an unclassified tributary of Bear Butte Creek which drains an area of approximately 1 mi<sup>2</sup>, and is approximately 1.5 mi long.

During the period of June 1984 to October 1985 Gilt Edge Inc. monitored the water quality of Butcher Gulch Creek at its headwaters (Figure 3, Site 6). Water quality was generally good, with the exception of pH which had a low 5.0 and a mean value of 5.24. Arsenic and cyanide were not detected. value of

No discharge data was located for Butcher Gulch Creek.

#### Ruby Gulch Creek:

Ruby Gulch Creek is an unclassified tributary of Bear Butte Creek which drains an area of approximately 1 mi<sup>2</sup>, and is approximately 1 mi long.

Gilt Edge Inc. also monitored the water quality of this stream between June 1984 and October 1985 (Figure 3, site 5). Water quality was good, the mean pH was 7.2, arsenic was very low (high of 0.003 mg/l), and cyanide was not detected.

No discharge data for Ruby Gulch Creek was detected.

#### Boomer Gulch Creek:

Boomer Gulch Creek is a tributary of Strawberry Creek which drains an area of approximately 1 mi<sup>2</sup> and is approximately 1.5 mi long. No discharge or water quality data was located.

#### GROUNDWATER (Meyer, 1984)

Aquifers in the proposed area of exploration are Quaternary Alluvium, Red River, Deadwood, and PreCambrian.

### Alluvial Aquifers:

In general, alluvial aquifers which overlie the PreCambrian central core of the Black Hills are composed of coarse gravels and have excellent water quality. Major sources of contamination occur in the form of mine tailings which have become part of the alluvial sediments, as in the lower reaches of Whitewood Creek.

### Red River Aquifer (Whitewood Formation):

The Red River Aquifer is overlain by the Englewood Limestone and is underlain by the Winnipeg and Deadwood Formations. It is deeply buried beneath other sediments except in the vicinity of the Black Hills. The limited data available for the Red River aquifer indicate that it is highly mineralized and probable unsuitable for most purposes. It may have fairly good water quality in the immediate vicinity of the Black Hills, but no data are available to support this theory.

### Deadwood Aquifer:

The Deadwood Formation is overlain by the Winnipeg and Whitewood Formations and underlain by Precambrian rocks. In the vicinity of the Black Hills, the Deadwood aquifer may have adequate water quality for domestic use, however, data is very limited.

### Precambrian Aquifer:

The Precambrian aquifer includes igneous and metamorphic rocks which compose the basement upon which the sedimentary rocks lie. The Tertiary igneous rocks which occur in the northern Black Hills are also grouped in the Precambrian aquifer.

The water quality of the Precambrian aquifer is generally excellent, but yields are fairly low. This aquifer is very vulnerable to contamination, especially where soils are thin or lacking.

### Water Wells:

A total of seven water wells within one-half mile of the proposed exploration area are on file at DWR. Gilt Edge Inc. possibly has a few more wells in the area, but the file could not be located.

The wells are of two main types; shallow, large diameter wells in Quaternary Alluvium, and deeper (up to 285 feet), smaller diameter wells drilled in the Deadwood and Precambrian aquifers. Well drillers reports are in the Appendix.

#### RECOMMENDATIONS:

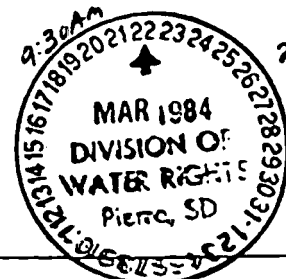
1. Brohm Mining Corporation (Gilt Edge, Inc.) should use special care when drilling near or through the old mine tailings along Strawberry Creek. Erosion of these tailings should be minimized, and all holes adequately plugged.
2. Alternate plugging procedures for holes penetrating old mine workings should be submitted to DWNR for approval.
3. DWNR should examine the possibility of having Gilt Edge, Inc. remove the tailings along Strawberry Creek for reprocessing.

#### REFERENCES

- Meyer, M., 1984, Evaluation of the Groundwater Resources of Western South Dakota, Task 5: Water Quality Suitability by Aquifer for Drinking, Irrigation, Livestock Watering and Industrial Use, South Dakota DWNR.
- Shapiro, L.H., and Gries, J.P., 1970, Ore Deposits in Rocks of Paleozoic and Tertiary Age of the Northern Black Hills, South Dakota, U.S.G.S. Open File Report, 235 p.

d62906jd.sm

## In The State Of South Dakota

Other Common Distribution System ☐Institutional ☐ Recreational ☐It(s) ☐ on Permit No. \_\_\_\_\_

Phone No. 348-3763

State SD 57702  
Zip Codeate of Deadwood formation)  
t 8 & Lot 12, Sec 5, T4N, R4E

360'N, 150'E; (C) 1450'N, 80'W;

50'W; all from quarter

County Lawrence

but mostly during summer.

any preliminary engineering report or other  
et if more space is needed)  
& cased in alluvium to bed-  
velopment for mine operations.  
o retain operations water,  
irculation of water.  
d in Deadwood formation.  
torage of water, is proposed. Attach map

\_\_\_\_\_ the applicant, certify that I have read  
ters therein stated are true and that I intend, and

*David A. Fredlund*

1 day of March 1984

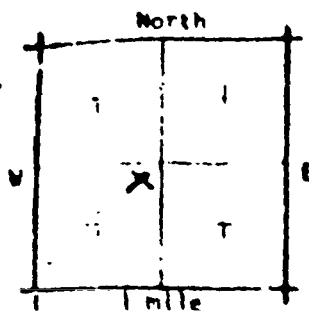
*W. J. J. J.*

Notary Public (or other qualified officer)

APPENDIX

STATE OF SOUTH DAKOTA WELL DRILLERS REPORT

Section No. 7 Twp. 4N Rg. 4E



Completion Date June 27-84

USE: ☐ Domestic ☐ Municipal ☐ Test Holes  
☐ Irrigation ☐ Industrial ☐ Stock

Method of Drilling:

Rotary

CONSTRUCTION:

Diameter of hole 6 inches Depth 255 feet

tubing: ☐ Steel ☒ Plastic ☐ Other  
 Specify \_\_\_\_\_

Pipe Weight Diameter From To  
 \_\_\_\_\_ lb/ft 6 inches 0 feet 20 feet  
 \_\_\_\_\_ lb/ft \_\_\_\_\_ inches \_\_\_\_\_ feet \_\_\_\_\_ feet

Is a well screen used? ☐ Yes ☒ No

If Not Specify \_\_\_\_\_

Screen Type \_\_\_\_\_ Slot Size \_\_\_\_\_

Length \_\_\_\_\_ Diameter \_\_\_\_\_

Was Casing left open end? ☒ Yes ☐ No

Was a Packer or seal used? ☐ Yes ☒ No

If so what material? \_\_\_\_\_

Was well gravel packed? ☐ Yes ☒ No

Was well grouted? ☒ Yes ☐ No

Describe grouting procedure Area around

Casing filled  
 to what depth? 20 feet

What was grouting material? Cement

If cement, how many sacks? 2

Location of packer(s) and screen or perforated pipe 20 ft

IS WELL PLUGGED OR ABANDONED ☐ Yes ☒ No  
 If so how and with what material? \_\_\_\_\_

Well Owner:

Name Jerry Flood

Address P.O. Box 112 Deadwood

Well Log: Depth

Formation	From	To
<u>Top soil &amp; Black Rock</u>	<u>0</u>	<u>9</u>
<u>Hard Deadwood</u>	<u>9</u>	<u>20</u>
<u>Deadwood red Hard</u>	<u>20</u>	<u>150</u>
<u>" Seal Hard sandstone</u>	<u>150</u>	<u>180</u>
<u>" " "</u>	<u>180</u>	<u>250</u>
<u>Hard Red Rock &amp; Sand</u>	<u>250</u>	<u>(255)</u>

STATIC WATER LEVEL (200) Feet

If flowing: closed in pressure \_\_\_\_\_ PSI

GPM flow \_\_\_\_\_ through \_\_\_\_\_ inch pipe

Controlled by ☐ Valve ☐ Reducers ☐ Other

If other; specify \_\_\_\_\_

Can well be completely \_\_\_\_\_

WELL TEST DATA:

☐ Pumped

☐ Bailed Describe: \_\_\_\_\_

☐ Other \_\_\_\_\_

Pumping Level Below Land Surface

\_\_\_\_\_ ft. After \_\_\_\_\_ Hrs. pumped \_\_\_\_\_ GPM

\_\_\_\_\_ ft. After \_\_\_\_\_ Hrs. pumped \_\_\_\_\_ GPM

\_\_\_\_\_ ft. After \_\_\_\_\_ Hrs. pumped \_\_\_\_\_ GPM

Remarks:

no pump in air test  
14 gal Per min

This well was drilled under license 171

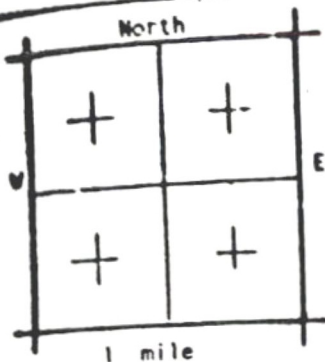
and this report is true and accurate

Thom Dickey Drilling Firm  
 Signed by \_\_\_\_\_

Date July 1/84

8-884

## 4-72



1 Sec. Twp. Rg.

☐ Domestic ☒ Municipal ☐ Test  
☐ Irrigation ☐ Industrial ☐ Holes  
☐ Stock

Billing: ☐ Forward Rotary ☐ Bored ☐ Jetted  
           ☐ Reverse Rotary ☐ Cable ☐ Other

**Instruction:**

~~Number~~ of Hole

**Keywords:**

 Steel  Concrete

☒ Plastic ☐ Other

If other, specify \_\_\_\_\_

 casing end left open

 • wall screen installed

### Describe Well Screen

Diameter	Material
----------	----------

Slot size<sup>a</sup>

the well gravel packed

~~The~~ well grouted

water sample taken

Water Level Information:  
 Static water level 3 ft below land surface  
 If flowing: closed In pressure \_\_\_\_\_ PSI  
 rate of flow \_\_\_\_\_ GPM

Controlled by: ☒ Valve ☐ Reducers ☐ Other

If other; specify \_\_\_\_\_

Well Test Data:

17 Pumped

**17 Balled**

☐ Other

Describe: 8 sp. m

Pumping Level Below Land Surface  
ft. After \_\_\_\_\_ Hrs. pumped \_\_\_\_\_ GPM

<u>          </u>	" "	<u>          </u>	" "	<u>          </u>
<u>          </u>	" "	<u>          </u>	" "	<u>          </u>
<u>          </u>	" "	<u>          </u>	" "	<u>          </u>

Well Log:

Depth

### Formation

From

To

(Use Back if Necessary)

Date Completed:

**Driller:**

Driller's or Firm's Name

License NO.

Address

**Signed By**

Date \_\_\_\_\_

THE FOLLOWING IT IS HEREBY CERTIFIED THAT THE INFORMATION CONTAINED HEREIN IS TRUE AND CORRECT AND WAS OBTAINED FROM THE PERSONS NAMED HEREIN AND IS NOT A MISREPRESENTATION OF THE NATIONAL BUREAU OF STANDARDS FOR INFORMATION TECHNOLOGY.

DATE OF CERTIFICATION 1-14-83

CHECK OPERATOR [Signature]

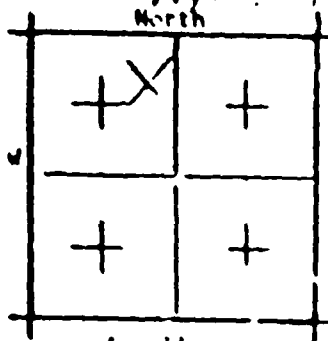
DATE RECEIVED

**Spencer**

**WELL DRILLERS REPORT**  
SOUTH DAKOTA WATER RIGHTS COMMISSION

4-78

Well Owner:  
Name Tim P. Aschbach  
Address 1422 1st St. S. Rapid City, SD 57701

Well Location: North  
Mark location with an "X"  
  
County LAWR.  
1 mile

County LAWR.  
T. 4N R. 4E S. 2

Proposed Use:  
☒ Domestic ☐ Municipal ☐ Test Holes  
☐ Irrigation ☐ Industrial ☐ Stock

Method of Drilling:  
☒ Forward Rotary ☐ Bored ☐ Jetted  
☐ Reverse Rotary ☐ Cable ☐ Other  
6" Plastic Pipe

Well Construction:  
Diameter of Hole 6"  
Depth 135'  
Casing ☐ Steel ☐ Concrete  
☒ Plastic ☐ Other  
If other, specify 20' 6"-160

Was casing end left open yes  
Was a well screen installed yes  
Describe Well Screen  
Diameter 6" Material steel  
Slot size 1/8"  
Was well gravel packed yes  
Was well grouted yes  
Was water sample taken yes

**Remarks:**

Well produces 1 1/2 gallon min.  
+ 180± gallon storage.  
I recommend setting pump at  
135' - 1/2 H.P. submersible - 5 gallon per min.

Water Level Information:  
Static water level 2.5' below land surface.  
If flowing: closed in pressure PSI  
rate of flow GPM

Controlled by:  
☐ Valve ☐ Reducers ☐ Other  
If other; specify \_\_\_\_\_

Well Test Data:  
☒ Pumped 1 1/2 HP  
☐ Bailed Describe: 1 1/2 HP  
☐ Other \_\_\_\_\_

Pumping Level Below Land Surface  
ft. After \_\_\_\_\_ hrs. pumped \_\_\_\_\_ GPM  
" " " " " "  
" " " " " "

**Well Log:**

Formation	From	To
Gravel	0	5
Clay	5	25
Gravel	35	45
Clay	45	55
Gravel	55	65
Clay	65	75
Gravel	75	85
Clay	85	95
Gravel	95	105
Clay	105	115
Gravel	115	125
Clay	125	135
Gravel	135	145
Clay	145	155
Gravel	155	165
Clay	165	175
Gravel	175	185
Clay	185	195
Gravel	195	205
Clay	205	215
Gravel	215	225
Clay	225	235
Gravel	235	245
Clay	245	255
Gravel	255	265
Clay	265	275
Gravel	275	285
Clay	285	295
Gravel	295	305
Clay	305	315
Gravel	315	325
Clay	325	335
Gravel	335	345
Clay	345	355
Gravel	355	365
Clay	365	375
Gravel	375	385
Clay	385	395
Gravel	395	405
Clay	405	415
Gravel	415	425
Clay	425	435
Gravel	435	445
Clay	445	455
Gravel	455	465
Clay	465	475
Gravel	475	485
Clay	485	495
Gravel	495	505
Clay	505	515
Gravel	515	525
Clay	525	535
Gravel	535	545
Clay	545	555
Gravel	555	565
Clay	565	575
Gravel	575	585
Clay	585	595
Gravel	595	605
Clay	605	615
Gravel	615	625
Clay	625	635
Gravel	635	645
Clay	645	655
Gravel	655	665
Clay	665	675
Gravel	675	685
Clay	685	695
Gravel	695	705
Clay	705	715
Gravel	715	725
Clay	725	735
Gravel	735	745
Clay	745	755
Gravel	755	765
Clay	765	775
Gravel	775	785
Clay	785	795
Gravel	795	805
Clay	805	815
Gravel	815	825
Clay	825	835
Gravel	835	845
Clay	845	855
Gravel	855	865
Clay	865	875
Gravel	875	885
Clay	885	895
Gravel	895	905
Clay	905	915
Gravel	915	925
Clay	925	935
Gravel	935	945
Clay	945	955
Gravel	955	965
Clay	965	975
Gravel	975	985
Clay	985	995
Gravel	995	1005

Date Completed: Aug 7 1979

Driller:  
Alexander Drill  
Driller's or Firm's Name 324 License No.  
Box 615 - Hill City SD  
Address

W. O. Alexander 8-15-79  
Signed By Date



EXN 1-2711  
INSPECTION REPORT

SEMS  
1930562

EXNI-271

# Inspection Report

OPERATOR: Brohm Mining Corp.  
PROJECT: EXNI-271  
INSPECTION DATE: 1/4/88  
INSPECTORS: Thomas Durkin T.D.  
Dale Snyder  
OPERATOR PRESENT: Doug Stewart  
Rod Macleod  
CONDITIONS: Sunny, 7 degrees F, 4 incl

On January 4, 1988 a pre-inspection was conducted. The above referenced people and Jim Haug (DECA) met at the field site at noon. 200 holes will be drilled to a maximum depth of 2,000 feet. All holes will be drilled off existing roads and trails. No tree clearing will be required. Drill pad size will be restricted to the width of the roads (i.e., approximately 20 ft.).

We first proceeded to the exploration area approximately 3/4 mile southwest of Anchor Hill (designated area 1 on the Field Map). The area is heavily wooded. Several holes are proposed at the historic Golden Crest Mine. No disturbance of archeological features is anticipated. Jim Haug said that drilling the proposed holes in this area is acceptable as long as historic sites are avoided. Numerous large old trenches and shafts exist in Area 1.

Photo 1 is taken along the road joining exploration areas 1 and 2, looking east toward the leach pad approximately 1/2 mile away. No potential environmental problems were noted at exploration area 2 (just west of Anchor Hill).

Photo 2 is taken at a proposed hole site (flagged red) at exploration area 3, north of Anchor Hill, looking east toward the head of Butcher Gulch.

The exploration area northeast of Anchor Hill has numerous unmapped existing roads present throughout. The roads were installed by Lacana and Amoco several years ago.

Photo 3 shows the southernmost of the 4 temporarily plugged holes (under EXNI-258). The hole is collared above the tailings in the NW 1/4 Section 8, 4N-4E. The holes temporarily plugged are at 600 feet and will be re-entered and drilled to a maximum depth of 2,000 feet under the proposed exploration project.

## COMMENTS & RECOMMENDATIONS:

1) Mr. Macleod informed me that Brohm's Vice President inquired as to why a new exploration permit would be required to deepen currently

permitted holes. I informed him that the EXNI-258 Notice of Intent specifically states that the maximum hole depth is 600 feet and that the restriction letter approves only the work described in the Notice of Intent. I said that when holes are to be drilled to deeper levels, additional aquifers may be encountered and subsequent restrictions applied. Thus, a separate permit is required due to the fact that a permit that has been issued can not be amended according to the current State laws.

2) In response to Brohm's comments on it's exploration Reclamation Plan, holes drilled in the pit area that are to be left open must be temporarily plugged as per ARSD 74:11:08:08. The method for temporary abandonment described in Brohm's December 16, 1987 letter to DWNR is sufficient. The temporary plug should remain in place until mining commences. Any other method should first be approved by DWNR.

Furthermore, any holes drilled deeper than the final pit depth should be plugged either from the hole bottom to the pit bottom level and temporarily abandoned above that point as described above, or plugged as per ARSD 74:11:08 to depth.

3) Standard drilling restrictions should also be included.

4) Mr. Macleod and Mr. Stewart conveyed Brohm's earnest desire to comply with State exploration and mining laws to maintain a good image regarding environmental concerns.

5) Rod Macleod's SDSM&T 1986 MS thesis entitled "The geology of the Gilt Edge Area, Northern Black Hills of SD" should be included in the Department's library.

Table - 1  
Brom water Quality Sampling Results.

BROM MINING CORPORATION  
GILY EDGE MINE  
water quality report

○ - At or exceeds water standard criteria

	SAMPLING STATION									
PARAMETER	GW1	GW4	GW5	GW6	GW7	SW2	SW3	SW4	SW5	SW6
Date	8-27-87	8-27-87	8-27-87	8-27-87	8-27-87	8-28-87	8-28-87	8-28-87	8-28-87	8-28-87
Depth to Water (ft)/Flow (CFS)	28	33.6	10.5	12.1	10.3	0.01667	1.44	0.0052	2.05	0.49
MINERALS										
Alkalinity (CaCO <sub>3</sub> ), mg/l	78	128	38	67	<1	<1	104	144	94	78
Bicarbonate (BCO <sub>3</sub> ), mg/l	95	156	46	82	<1	<1	127	176	115	95
Carbonate (CO <sub>3</sub> ), mg/l	0	0	0	0	<1	<1	0	0	0	0
Chloride (Cl), mg/l	2	1	<1	2	3	25	4	4	7	3
Sulfate (SO <sub>4</sub> ), mg/l	46	57	39	45	678	1354	47	44	36	90
Calcium (Ca), mg/l	42	66	14	28	90	117	40	50	38	52
Magnesium (Mg), mg/l	7	6	4	6	24	31	10	11	10	10
Potassium (K), mg/l	1	3	2	4	4	4	4	4	4	4
Sodium (Na), mg/l	3	4	4	7	10	9	4	4	4	4
Major Anion, MEQ/L	2.58	3.78	1.57	2.34	14.22	28.85	3.17	3.91	2.83	3.53
Major Cations, MEQ/L	2.84	4.03	1.57	2.29	13.02	26.37	3.09	3.67	2.99	3.68
Cation - Anion Balance, %	4.8	3.2	0	1.08	4.41	4.49	1.28	3.17	2.75	2.08
PARAMETER -- MISCELLANEOUS										
pH, Units	7.03	7.39	5.9	6.45	3.19	2.73	7.92	7.68	7.85	7.58
Conductivity, umhos/cm	275	360	125	240	1347	2700	300	345	290	355
Cyanide, Total, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cyanide, WAD, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Cyanide, Free, mg/l	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Hardness (CaCO <sub>3</sub> ), CPG:mg/l	134	190	71	25	324	420	141	170	136	171
Solids, Dissolved, mg/l	192	247	152	270	1108	2172	1.86	226	193	205
Solids, Suspended, mg/l	5	6	57	88	2	12	4	<1	2	<1
Turbidity, NTU	12	20	175	250	8	47	12	4	8	8
METALS										
Antimony (Sb), mg/l	0.021	0.009	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Aluminum (Al), mg/l	0.37	0.19	2.27	0.78	45.1	58.6	0.28	0.19	0.23	0.33
Arsenic (As), mg/l	0.006	0.01	0.007	<0.005	<0.005	0.106	0.005	<0.005	<0.005	0.007
Beryllium (Be), mg/l	<0.0005	<0.0005	<0.0005	<0.0005	0.22	0.0102	<0.0005	<0.0005	<0.0005	<0.0005
Boron (B), mg/l	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Cadmium (Cd), mg/l	0.0006	<0.0005	0.0012	0.0017	0.03	0.0298	0.0013	0.0005	0.0006	0.0016
Chromium (Cr), mg/l	0.033	0.019	0.032	0.036	0.047	0.039	0.017	0.016	0.014	0.014
Cobalt (Co), mg/l	0.005	<0.005	<0.005	0.015	0.199	0.331	0.008	0.008	<0.005	0.014
Copper (Cu), mg/l	0.016	0.011	0.024	0.036	3.71	9.8	0.015	0.009	0.01	0.044
Iron (Fe), mg/l	1.87	1.68	5.68	29	9.93	187	0.44	0.26	0.28	0.39
Lead (Pb), mg/l	<0.005	0.006	0.007	0.015	0.015	0.005	<0.005	<0.005	<0.005	<0.005
Lithium (Li), mg/l	0.006	<0.005	0.006	0.011	0.05	0.054	0.01	0.006	0.009	0.007
Manganese (Mn), mg/l	0.06	0.27	0.08	1.45	3.78	3.9	0.06	0.07	0.03	0.13
Mercury (Hg), mg/l	0.002	0.012	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.002	<0.0002
Molybdenum (Mo), mg/l	<0.05	<0.05	<0.05	0.108	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Nickel (Ni), mg/l	0.014	<0.005	0.018	0.172	0.083	0.267	0.136	0.914	0.244	0.228
Selenium (Se), mg/l	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Silver (Ag), mg/l	<0.0005	<0.0005	<0.0005	0.0129	0.0015	0.002	0.0014	0.0006	<0.0005	0.0005
Vanadium (V), mg/l	<0.005	<0.005	<0.005	<0.005	0.28	0.36	<0.005	<0.005	<0.005	<0.005
Zinc (Zn), mg/l	0.01	0.04	0.05	0.06	2.26	2.39	0.11	0.02	0.015	0.08
PARAMETER -- Nutrients										
Nitrogen, Ammonia, mg/l	<0.03	<0.03	<0.03	<0.03	0.37	0.47	0.05	<0.03	<0.03	0.05
Nitrogen, Nitrate, mg/l	0.15	0.13	0.13	0.15	0.61	3	<0.10	<0.10	<0.10	<0.10
Nitrogen, Nitrite, mg/l	<0.01	<0.01	<0.01	0.06	0.05	0.03	<0.01	<0.01	<0.01	<0.01
Nitrogen, Total Kjeldahl, mg/l	0.21	0.18	0.21	0.13	0.43	0.58	0.15	0.15	0.26	0.25
Phosphorus, Total, mg/l	0.094	0.64	0.093	0.06	0.058	0.034	0.019	0.027	0.022	0.018

# Appendix 1.

## Water Quality Suitability Parameters By Aquifer

### PRECAMBRIAN AQUIFER

PARAMETER	NUMBER OF SAMPLES LATEST (TOTAL)	MEAN	STANDARD DEVIATION	MEAN 95% CONFIDENCE INTERVAL	MINIMUM	MAXIMUM
Depth of Well, Total (feet)	93	92.01	82.89	74.8-108.6	9.8	525.0
Specific Conductance (umhos)	73 (76)	356.99	196.32	312.0-402.0	70.0	1130.0
Total Solids, Residue at 180 C (mg/l)	24 (70)	240.33	129.48	185.7-295.0	97.0	699.0
Hardness (mg/l as CaCO <sub>3</sub> )	95 (141)	161.16	81.03	144.9-177.4	15.0	480.0
Sodium (mg/l)	93 (136)	8.58	5.83	7.4-9.8	0.1	34.0
Sodium Adsorption Ratio (SAR)	92 (135)	0.31	0.19	0.21-0.35	0.0	1.1
Sulfate (mg/l)	95 (141)	26.40	41.25	18.1-34.7	5.0	345.0
Chloride (mg/l)	94 (140)	11.19	8.08	9.6-12.8	1.0	48.0
Fluoride (mg/l)	34 (88)	0.35	0.31	0.25-0.45	0.0	1.87
Nitrogen, Nitrate Total (mg/l as N)	26 (79)	0.60	0.90	0.23-0.97	0.0	3.5
Boron, Total (ug/l)	64 (64)	30.91	40.32	21.0-40.8	5.0	227.0
Iron, Total (ug/l)	87 (131)	104.97	421.82	16.3-193.6	0.0	3150.0
Manganese, Total (ug/l)	82 (122)	158.41	313.31	90.6-226.2	0.0	1298.0
Selenium, Total (ug/l)	69 (83)	0.44	0.63	0.28-0.60	0.2	4.4
Arsenic, Total (ug/l)	69 (83)	3.49	12.63	0.5-6.5	0.5	103.0
Barium, Total (ug/l)	70 (83)	37.95	43.86	27.7-48.2	2.0	255.0
Cadmium, Total (ug/l)	5 (19)	1.00	0.00	-	1.0	1.0
Chromium, Total (ug/l)	69 (83)	4.31	2.66	3.7-4.9	1.0	25.0
Lead, Total (ug/l)	5 (22)	2.48	2.55	0.0-5.6	1.0	7.0
Mercury, Total (ug/l)	5 (19)	0.20	0.00	-	0.2	0.2
Silver, Total (ug/l)	69 (83)	2.06	0.66	1.9-2.2	1.0	6.0
Radium-226, Dissolved (pCi/l)	1 (5)	1.43	-	-	-	-
Uranium, Natural Total (ug/l)	64 (65)	2.12	2.81	1.4-2.8	0.2	10.0
Gross Alpha, Total ug/l as U)	2 (16)	5.54	7.21	0.0-70.2	0.45	10.6

# Water Quality Suitability Parameters By Aquifer

## DEADWOOD AQUIFER

PARAMETER	NUMBER OF SAMPLES LATEST (TOTAL)	MEAN	STANDARD DEVIATION	MEAN 95% CONFIDENCE INTERVAL	MINIMUM	MAXIMUM
Depth of Well, Total (feet)	5	634.20	421.50	110.9-1157.9	30.0	1170.0
Specific Conductance (umhos)	11 (15)	489.36	145.90	391.4-587.4	210.0	750.0
Total Solids, Residue at 180 C (mg/l)	9 (16)	288.33	95.08	215.3-361.4	209.0	528.0
Hardness (mg/l as CaCO3)	15 (23)	251.47	109.81	190.7-312.3	130.0	560.0
Sodium (mg/l)	12 (19)	12.53	23.84	0.0-27.7	1.0	87.0
Sodium Adsorption Ratio (SAR)	11 (17)	0.44	0.86	0.0-1.01	0.0	3.0
Sulfate (mg/l)	13 (21)	25.85	27.85	9.0-42.7	4.0	88.0
Chloride (mg/l)	13 (21)	8.62	10.42	2.3-14.9	0.3	40.0
Fluoride (mg/l)	8 (19)	0.50	0.47	0.13-0.87	0.01	1.35
Nitrogen, Nitrate Total (mg/l as N)	6 (16)	0.18	0.18	0.0-0.36	0.0	0.5
Boron, Total (ug/l)	5 (5)	22.40	9.58	10.5-34.3	11.0	35.0
Iron, Total (ug/l)	8 (15)	58.75	100.14	0.0-142.5	10.0	300.0
Manganese, Total (ug/l)	8 (15)	138.38	348.37	0.0-429.7	2.0	1000.0
Selenium, Total (ug/l)	6 (10)	0.37	0.32	0.04-0.70	0.2	1.0
Arsenic, Total (ug/l)	6 (10)	2.98	3.53	0.0-6.7	0.5	9.7
Barium, Total (ug/l)	6 (10)	45.83	25.48	20.1-71.5	14.0	83.0
Cadmium, Total (ug/l)	1 (5)	1.0	-	-	-	-
Chromium, Total (ug/l)	6 (10)	3.83	1.60	2.2-5.5	1.0	6.0
Lead, Total (ug/l)	1 (5)	12.0	-	-	-	-
Mercury, Dissolved (ug/l)	4 (5)	0.08	0.05	0.0-0.18	0.0	0.1
Silver, Total (ug/l)	6 (10)	2.00	0.63	1.3-2.7	1.0	3.0
Radium-226, Dissolved (pCi/l)	1 (4)	0.30	-	-	-	-
Uranium, Natural Total (ug/l)	5 (6)	2.91	2.78	0.0-6.4	0.7	7.35
Gross Alpha, Total(ug/l as U)	- (3)?	-	-	-	-	-

4/84 WATSTORE data

# Water Quality Suitability Parameters By Aquifer

## RED RIVER AQUIFER

PARAMETER	NUMBER OF SAMPLES LATEST (TOTAL)	MEAN	STANDARD DEVIATION	MEAN 95% CONFIDENCE INTERVAL	MINIMUM	MAXIMUM
Depth of Well, Total (feet)	34	7837.38	1546.32	7317.6-8357.2	5056.0	9769.0
Specific Conductance (umhos)	1 (2)	3330.00	-	-	-	-
Total Solids, Residue at 180 C (mg/l)	48 (86)	16117.52	30875.77	7382.7-24852.3	1673.0	202500.0
Hardness (mg/l as CaCO3)	58 (113)	1997.07	2924.66	1244.4-2749.8	240.0	20030.0
Sodium (mg/l)	48 (89)	5375.16	11360.17	2161.4-8589.0	3.7	74740.0
Sodium Adsorption Ratio (SAR)	48 (89)	45.36	50.53	31.1-59.6	0.0	320.0
Sulfate (mg/l)	58 (115)	1588.57	717.25	1404.0-1773.2	192.0	4475.0
Chloride (mg/l)	58 (115)	8447.76	18543.08	3675.5-13220.0	40.0	122500.0
Fluoride (mg/l)	8 (12)	3.60	0.77	2.97-4.23	2.8	5.0
Nitrogen, Nitrate Total (mg/l as N)	9 (13)	0.31	0.66	0.0-0.81	0.0	2.0
Boron, Dissolved (ug/l)	1 (2)	0.00	-	-	-	-
Iron, Total (ug/l)	34 (52)	3938.57	13317.51	0.0-8415.0	0.0	60000.0
Manganese, Total (ug/l)	9 (12)	802.22	1089.78	0.0-1639.9	0.0	3000.0
Selenium, Total (ug/l)	1 (1)	0.0	-	-	-	-
Arsenic, Total (ug/l)	-	-	-	-	-	-
Barium, Total (ug/l)	4 (4)	0.0	0.0	-	0.0	-
Cadmium, Total (ug/l)	-	-	-	-	-	-
Chromium, Total (ug/l)	-	-	-	-	-	-
Lead, Total (ug/l)	-	-	-	-	-	-
Mercury, Total (ug/l)	-	-	-	-	-	-
Silver, Total (ug/l)	-	-	-	-	-	-
Radium-226, Dissolved (pCi/l)	-	-	-	-	-	-
Uranium, Natural Total (ug/l)	-	-	-	-	-	-
Gross Alpha, Total(ug/l as U)	-	-	-	-	-	-

June 30, 1987

MEMO TO: Bob Townsend, Program Chief

FROM: John Dadoly, Intern

SUBJECT: Brohm Mining Corp. EXN1 <sup>258</sup> JD

## INTRODUCTION

Brohm Mining Corporation is proposing an exploration program which involves drill holes on 200 foot centers for condemnation and to further identify ore. The exploration is for precious metals (gold) and involves T4N, R4E, sections 5,6,7,8 (Figure 1.). This area has been previously permitted as a mine site (permit #439). Site will be accessed by existing roads and timber removal access routes.

## GEOLOGY

The proposed area of exploration is underlain by Tertiary (Eocene and Paleocene) intrusives, ranging in composition between trachyte and rhyolite, which have intruded Precambrian metasediments and metavolcanics, and the overlying Cambrian and Ordovician sediments. A portion of the area is overlain by Oligocene sediments of the White River Group (Figure 2).

### PreCambrian Rocks:

These Early Proterozoic units are metasediments and metavolcanics of the Ellison, Flag Rock, and Grizzly Formations along with unnamed age-equivalent strata.

### Paleozoic Rocks:

#### Deadwood Formation (Cambrian):

The Deadwood Formation is composed of: massive sandstone, greenish grayconitic shale, dolomite and flat pebble limestone conglomerate, and sandstone with conglomerate locally at the base. It is 10-400 feet thick.

#### Winnipeg Formation (Ordovician):

The Winnipeg Formation is composed of green shale with siltstone, and ranges between 0 and 100 feet thick.

#### Whitewood Formation (Ordovician):

The Whitewood Formation is a light-colored limestone unit which is locally dolomitic, and ranges between 0 and 60 feet thick.



# Water Quality Suitability Parameters By Aquifer

## ALLUVIAL AQUIFERS

PARAMETER	NUMBER OF SAMPLES LATEST (TOTAL)	MEAN	STANDARD DEVIATION	MEAN 95% CONFIDENCE INTERVAL	MINIMUM	MAXIMUM
Depth of Well, Total (feet)	79	34.51	17.64	30.6-38.4	6.6	90.0
Specific Conductance (umhos)	145 (156)	2351.46	1853.91	2049.7-2653.2	360.0	10800.0
Total Solids, Residue at 180 C (mg/l)	114 (236)	1493.52	1606.59	1198.6-1788.4	108.0	8490.0
Hardness (mg/l as CaCO3)	208 (332)	654.63	643.82	567.1-742.1	16.0	5000.0
Sodium (mg/l)	197 (305)	257.06	307.35	214.1-300.0	1.0	1990.0
Sodium Adsorption Ratio (SAR)	198 (306)	5.48	6.44	4.58-6.38	0.0	55.0
Sulfate (mg/l)	205 (326)	738.82	873.77	619.2-858.4	0.0	5230.0
Chloride (mg/l)	204 (324)	59.05	204.79	31.0-87.2	0.1	2610.0
Fluoride (mg/l)	109 (228)	0.58	0.48	0.48-0.67	0.1	4.0
Nitrogen, Nitrate Dissolved(mg/l as N)	42 (43)	66.07	295.97	0.0-155.58	0.0	1581.0
Boron, Total (ug/l)	78 (78)	337.23	278.87	275.3-399.1	0.04	1476.0
Iron, Total (ug/l)	150 (266)	1016.21	7678.47	0.0-2245.0	0.0	93000.0
Manganese, Total (ug/l)	133 (244)	294.50	755.36	166.1-422.9	0.0	4400.0
Selenium, Total (ug/l)	94 (131)	1.27	3.41	0.58-1.95	0.2	21.0
Arsenic, Total (ug/l)	88 (114)	1.48	1.77	1.11-1.85	0.5	7.9
Barium, Total (ug/l)	88 (114)	33.18	58.83	20.9-45.5	3.0	397.0
Cadmium, Total (ug/l)	10 (37)	1.23	0.73	0.7-1.8	1.0	3.3
Chromium, Total (ug/l)	88 (115)	3.99	1.49	3.7-4.3	1.0	12.0
Lead, Total (ug/l)	10 (39)	2.09	1.12	1.3-2.9	1.0	4.1
Mercury, Total (ug/l)	10 (38)	0.21	0.04	0.19-0.23	0.2	0.34
Silver, Total (ug/l)	88 (113)	2.49	2.71	1.9-3.1	1.0	20.0
Radium-226, Dissolved (pCi/l)	2 (7)	0.97	0.74	0.0-7.7	0.45	1.5
Uranium, Natural Total (ug/l)	78 (78)	19.96	21.90	15.1-24.8	0.2	115.0
Gross Alpha, Total ug/l as U)	6 (25)	12.63	14.67	0.0-28.0	1.2	39.3

4/84 WATSTORE data



Department of Water and Natural Resources  
Exploration and Mining Program  
Joe Foss Building, Fourth Floor  
Pierre, South Dakota 57501  
Telephone: 605/773-4201

EXPLORATION RECLAMATION PLAN

Pursuant to SDCL 45-6C-8 and  
45-6D-9

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MINING

In preparing this Reclamation Plan, please address each item in detail, following SDCL 45-6C-8 and 45-6D-9. Also, refer to the reclamation standards outlined under SDCL 45-6C-27 through 45-6C-34, SDCL 45-6D-33 through 45-6D-39, and the state's hole plugging regulations as detailed under ARSD 74:11.

1.) Describe the type of reclamation the operator proposes to achieve in the reclamation of the affected land.

A. Temporary Reclamation Will

Stabalize and cover the affected area with near natural vegetation and restore each drill site and other affected land as nearly as possible to its original condition by: reclaiming drill sites and access roads where possible, removal of all foreign debris, backfilling all depressions, scattering drill cuttings, re-seeding all disturbed land, and filling and plugging all drill holes except those holes occuring within the pit areas.

B. Permanent Reclamation is shown in the following documents:

Gilt Edge Project Comprehensive Reclamation Plan, August 13, 1986 prepared by Larry F. Brown for Brohm Resources, Inc. for submission to South Dakota Department of Water and Natural Resources.

- 2.) Provide a proposed timetable for seeding and replanting indicating when and how the reclamation plan will be implemented. Such timetable shall be developed after consulting with the County District Conservationist as to the nature of the soils and native vegetation in the area of the proposed operation. These recommendations shall be followed, if any are provided, and copies of all correspondence shall be provided to the Department.

The schedule will be developed through consultation with the Lawrence County Conservationist and consistent with the Approval Mining Plan. All recommendations of the District will be followed as provided and will be performed as soon after completion of the drilling program as possible, considering favorable planting conditions. Mixtures and distribution will be recommended by the District.

Areas not disturbed by mining will be seeded with the following mixture:

- (1) Western Wheatgrass (*Agropyron smithii*)
- (2) Little Bluestem (*Andropogen sloparious*)
- (3) Sideoats Grama (*Bouteloua curtipendula*)
- (4) Smooth Bromgrass (*Bromus inermis*)
- (5) Green Needlegrass (*Stipa viridula*)

3.) Describe how the reclamation plan will rehabilitate the affected land.

All drilling conducted under this Notice of Intent will be from existing roads and trails with minimal impact to the environment. All roads that will no longer be needed for the continuing exploration and mining activities on the property will be reclaimed, closed to traffic, and re-seeded in accordance to recommendations by the District Conservationist. Re-seeding will be carried out upon completion of the project and as an on-going program. All drill sites will be promptly regraded and all trash and other debris will be hauled off the site to an accepted refuse disposal facility.

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SECTION 101  
FEDERAL LANDS

✓

- 4.) Describe the anticipated temporary and permanent plugging and capping procedures to be used (refer to SDCL 45-6C-28 through 45-6C-30; SDCL 45-6D-33 through 45-6D-35, and the state's hole plugging regulations as detailed under ARSD 74:11).

All holes will be sealed pursuant to SDCL 45-6C-28 through 45-6C-30; SDCL 45-6D-33, and the state's hole plugging regulations as detailed under ARSD 74:11.

All drill holes will be sealed utilizing one of the following methods:

(a) If drilling is conducted using air, plugging shall be accomplished by filling with cuttings derived from the hole or a comparable free flowing aggregate and then capped with cement, followed by soil and re-seeding in accordance with ARSD 74:11:08:04 "Minimal Acceptable Plugging Method".

(b) If the drill hole intercepts substantial water, plugging shall be accomplished by filling with a sulfate resistant cement grout followed by a re-seeded soil cap in accordance to ARSD 74:11:08:07 "Plugging Artesian Wells".

It is anticipated that all drill holes will be permanently plugged during the program; however, in the event temporary plugging becomes necessary in order to re-enter a hole, a four foot length of steel pipe will be installed in the collar and marked clearly to indicate its presence.

- 5.) Provide the estimated cost of: a) implementing and completing the proposed reclamation and; b) the estimated cost of plugging and sealing each test hole.

Estimated Maximum Temporary Reclamation Costs - \$4000  
(Based on a maximum surface disturbance of 5 acres with no mining disturbance later.)

Estimated hole plugging costs - \$3000

A \$20,000 bond has been posted with the State to cover this project and any additional exploration. (Also, refer to reclamation plan and bond for mine site.)

Operator Signature: Doug Stewart

Title: Sulphide Project Manager

Date: Dec 8, 1987

CONSERVATION DISTRICT



United States  
Department of  
Agriculture

Soil  
Conservation  
Service

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EXPLORATION AND  
MINING PROGRAM

January 26, 1988

Douglas Stewart  
Sulphide Project Manager  
Brohm Mining Corporation  
P. O. Box 485  
Deadwood, South Dakota 57732

Re: Test holes  
Application dated 12/8/87  
Reseeding and Reclamation  
T4N, R4E, Section 5, 6, N½ of 7 & 8

Dear Doug,

The following seeding mixture was recommended previously to Fletcher & Associates on the Gilt Edge property and is suitable for these areas also.

I would recommend the following seed mixture for reseeding these drill hole areas.

Little Bluestem	- 20%	- 1.6#	Pure Live Seed (PLS) per Acre
Sideoats Grama	- 20%	- 2.4#	Pure Live Seed (PLS) per Acre
Green Needlegrass	- 20%	- 2.4#	Pure Live Seed (PLC) per Acre
Western Wheatgrass	- 20%	- 3.0#	Pure Live Seed (PLS) per Acre
Timothy	- 10%	- .25#	Pure Live Seed (PLS) per Acre
Smooth Bromegrass	- 10%	- 2.0#	Pure Live Seed (PLS) per Acre
Yellow Blossum - Sweet Clover	-	- 1#	Pure Live Seed (PLS) per Acre

Total of 13.65# - Pure Live Seed per acre.

If you have further questions please contact me at 892-4315.

Sincerely,

*Charles J. Logan*

Charles J. Logan  
District Conservationist  
Soil Conservation Service  
HCR 30 - Box 34  
Belle Fourche, So. Dak. 57717

cc. Thomas V. Durkin  
CT Corp.  
Lawrence Conservation District



The Soil Conservation Service  
is an agency of the  
United States Department of Agriculture





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MINING PROGRAM

January 26, 1988

Scott Wanstedt  
Environmental Specialist  
Brohm Mining Corporation  
P. O. Box 483  
Deadwood, South Dakota 57732

Re: Gilt Edge Project  
Expansion Amendment  
T4N, R4E, S1M  
Section 5, 6, N½ 7, N½ 8

Dear Mr. Wanstedt

The Lawrence Conservation District Supervisors and I have received your expansion plan in the areas described above, bordering the land presently permitted.

Reclamation and seeding plans previously given for the permitted area are suitable to this area, also as the soils and vegetation are similar.

If you have further questions, please contact me at 892-4315.

Sincerely,

Charles J. Logan  
District Conservationist  
Soil Conservation Service  
HCR 30 - Box 34  
Belle Fourche, South Dakota 57717

cc. Thomas V. Durkin, Dept. of Water & Natural Resources  
CT Corporation  
Lawrence Conservation District



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EXPLORATION AND  
MINING PERMIT

January 5, 1988

Mr. Doug Stewart  
Sulphide Project Manager  
Brohm Mining Corporation  
P.O. Box 485  
Deadwood, S.D. 57732

Re: Gilt Edge Project  
Expansion Amendment  
T4N, R4E, SDM  
Section 5, 6, N47, N48

Dear Mr. Stewart:

The Lawrence Conservation District Supervisor's and I have received your expansion plan in the areas described above, bordering the land presently permitted.

Reclamation and seeding plans previously given for the permitted area are suitable to this area also as the soils and vegetation are similar.

If you have further questions, please contact me.

Charles J. Logan  
District Conservationist  
Soil Conservation Service  
HCR 30 - Box 34  
Belle Fourche, South Dakota 57717

cc. Tom Durkin, Dept. of Water & Natural Resources  
CT Corporation  
Lawrence Conservation District



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is an agency of the  
United States Department of Agriculture



December 14, 1987

Mr. Chuck Logan  
District Conservationist  
Soil Conservation Service  
HCR 30 - Box 34  
Belle Fourche, SD 57717

Dear Chuck,

In accordance with SDCL 45-6C-8, please find enclosed information regarding the notice of intent to conduct exploration filed with the Department of Water & Natural Resources (DWNR) by **Brohm Mining Corp.**

To facilitate the permit process, I always advise the operator to contact your office concurrently with filing the application with DWNR, however, Brohm failed to do so. Therefore, I have enclosed the notice of intent, reclamation plan, and map of area to be explored.

Please address your comments to:

Mr. Doug Stewart  
Sulfide Project Manager  
Brohm Mining Corp.  
PO Box 485  
Deadwood, SD 57732

Please send me a copy of your response. If you require any additional information, please contact me.

Sincerely,

Thomas V. Durkin  
Hydrologist  
Exploration & Mining Program  
Telephone: (605) 773-4201

Enclosures

EDUCATION & CULTURAL AFFAIRS

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History

Doug Stewart  
January 8, 1988  
Page 2

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survey were also not the same which you have indicated on your map for the drilling project. Was the geotechnical and monitor well drilling part of another permit? If so, I was never notified of Brohm's intent. In this case it fortunately did not cause a problem. I hope that communications will be improved in the future in order to help help avoid delays and keep your project scheduling on track.

If you have any questions or require further information, please let me know.

Sincerely,

James K. Haug  
Assistant State Archaeologist

cc: Tom Durkin, Exploration and Mining Program, DWNR

December 14, 1987

Mr. Jim Haug  
DECA - Office of History  
2425 E. St. Charles St.  
Box 5005  
Rapid City, SD 57701

Dear Jim,

In accordance with SDCL 45-6C-11, please find enclosed information regarding the notice of intent to conduct exploration filed with the Department of Water & Natural Resources (DWNR) by **Brohm Mining Corp.**

To facilitate the permit process, I always advise the operator to contact your office concurrently with filing the application with DWNR, however, Brohm failed to do so. Therefore, I have enclosed the notice of intent, reclamation plan, and map of area to be explored.

Please address your comments to:

Mr. Doug Stewart  
Sulfide Project Manager  
Brohm Mining Corp.  
PO Box 485  
Deadwood, SD 57732

Please send me a copy of your response. If you require any additional information, please contact me.

Sincerely,

Thomas V. Durkin  
Hydrologist  
Exploration & Mining Program  
Telephone: (605) 773-4201

Enclosures

JAN 8 196

**Division of Wildlife**

GAME, FISH, & PARKS

proposed exploration  
have the following

on of any roads or

l.

December 14, 1987

Mr. Barry Parrish  
SD Dept. of Game, Fish, & Parks  
Wildlife Division - Regional Office  
3305 W. South St.  
Rapid City, SD 57702

Dear Barry,

In accordance with SDCL 45-6C-10, please find enclosed information regarding the notice of intent to conduct exploration filed with the Department of Water & Natural Resources (DWNR) by **Brohm Mining Corp.**

To facilitate the permit process, I always advise the operator to contact your office concurrently with filing the application with DWNR, however, Brohm failed to do so. Therefore, I have enclosed the notice of intent, reclamation plan, and map of area to be explored.

Please address your comments to:

Mr. Doug Stewart  
Sulfide Project Manager  
Brohm Mining Corp.  
PO Box 485  
Deadwood, SD 57732

Please send me a copy of your response. If you require any additional information, please contact me.

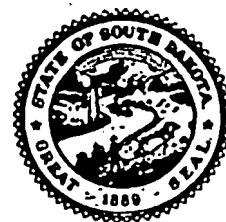
Sincerely,

Thomas V. Durkin  
Hydrologist  
Exploration & Mining Program  
Telephone: (605) 773-4201

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DEPARTMENT OF  
WATER & NATURAL RESOURCES  
JOE FOSS BUILDING  
PIERRE, SOUTH DAKOTA 57501



Date Wells, 4N-4E-5-8

To 5N-4E-31,32  
4N-3E-1,12

From \_\_\_\_\_

Subject:	Depth	Static level	Yield
	40 90	115 55	6 6
	34 40	115 5	5 5
	130 144	30 78	10
	57 99	12 14	12
	57 63	7 50	16
	64 350	8 7	3
	144 140	28 75	8
	275 155	19 87	4.5
	305	105	12
	300	240	12
	145	23	8
	70	3	14
	285	200	



EXN1-271  
MAPS

SEM 8  
1930 542



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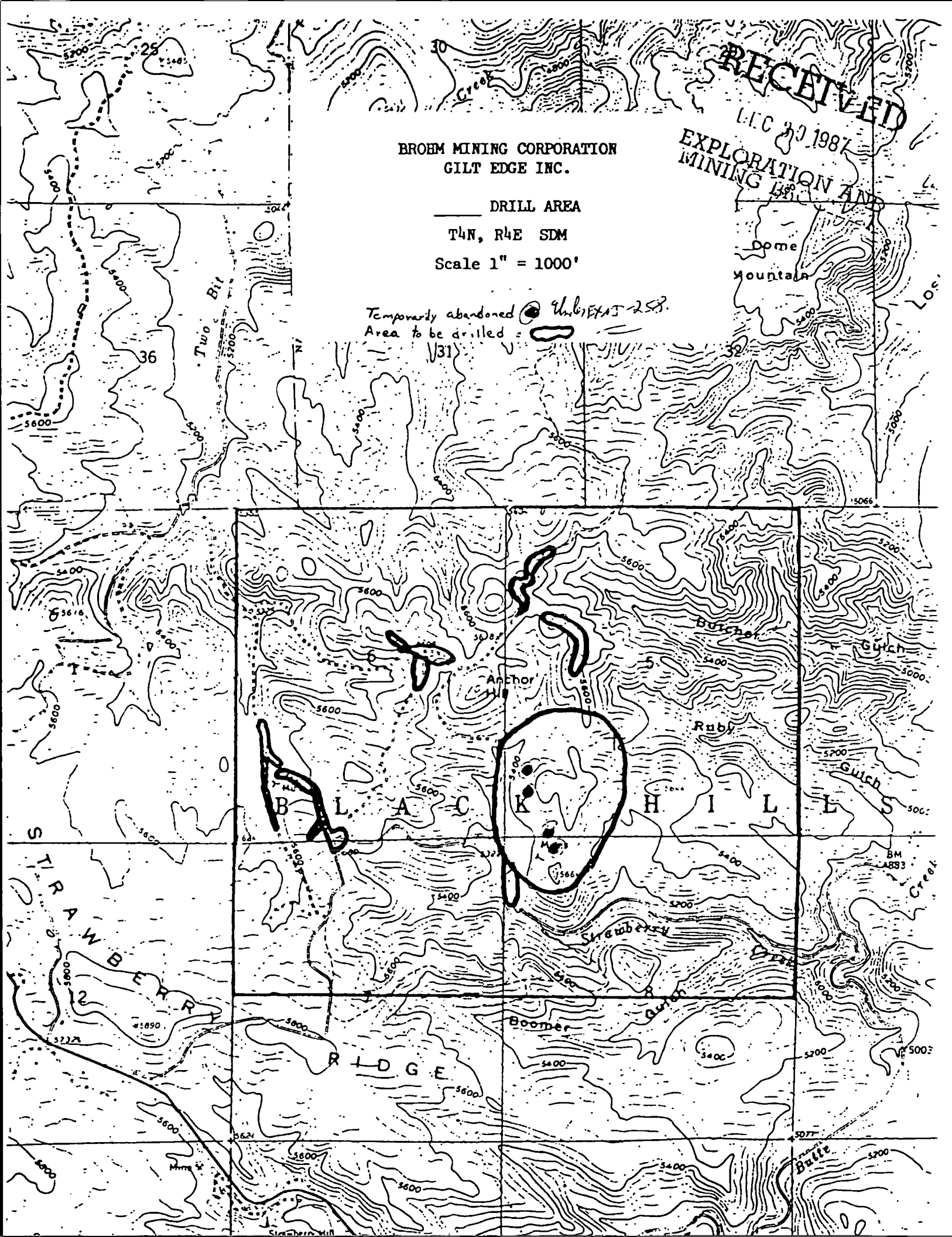
BROEM MINING CORPORATION  
GILT EDGE INC.

DRILL AREA

T4N, R4E SDM

Scale 1" = 1000'

Temporarily abandoned  Unlabeled 258.  
Area to be drilled:   
V31



map doesn't show hole  
locations, wells

- will drilling intercept  
aquifers whose depth  
is established (monitoring  
wells?)

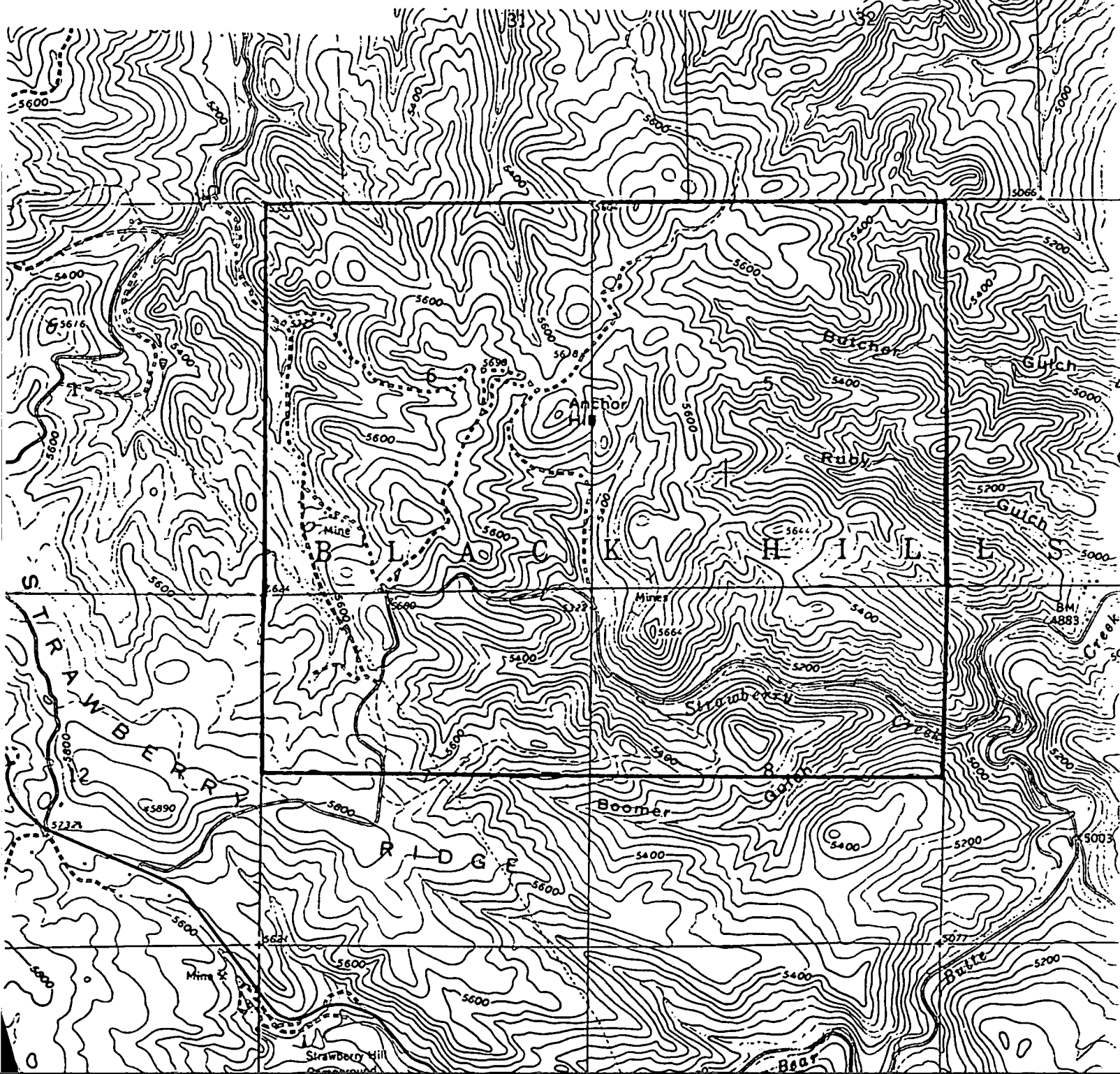
BROHM MINING CORPORATION  
GILT EDGE INC.

DRILL AREA

T4N, R4E, S4M

Scale 1" = 1000'

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GILT EDGE INC.

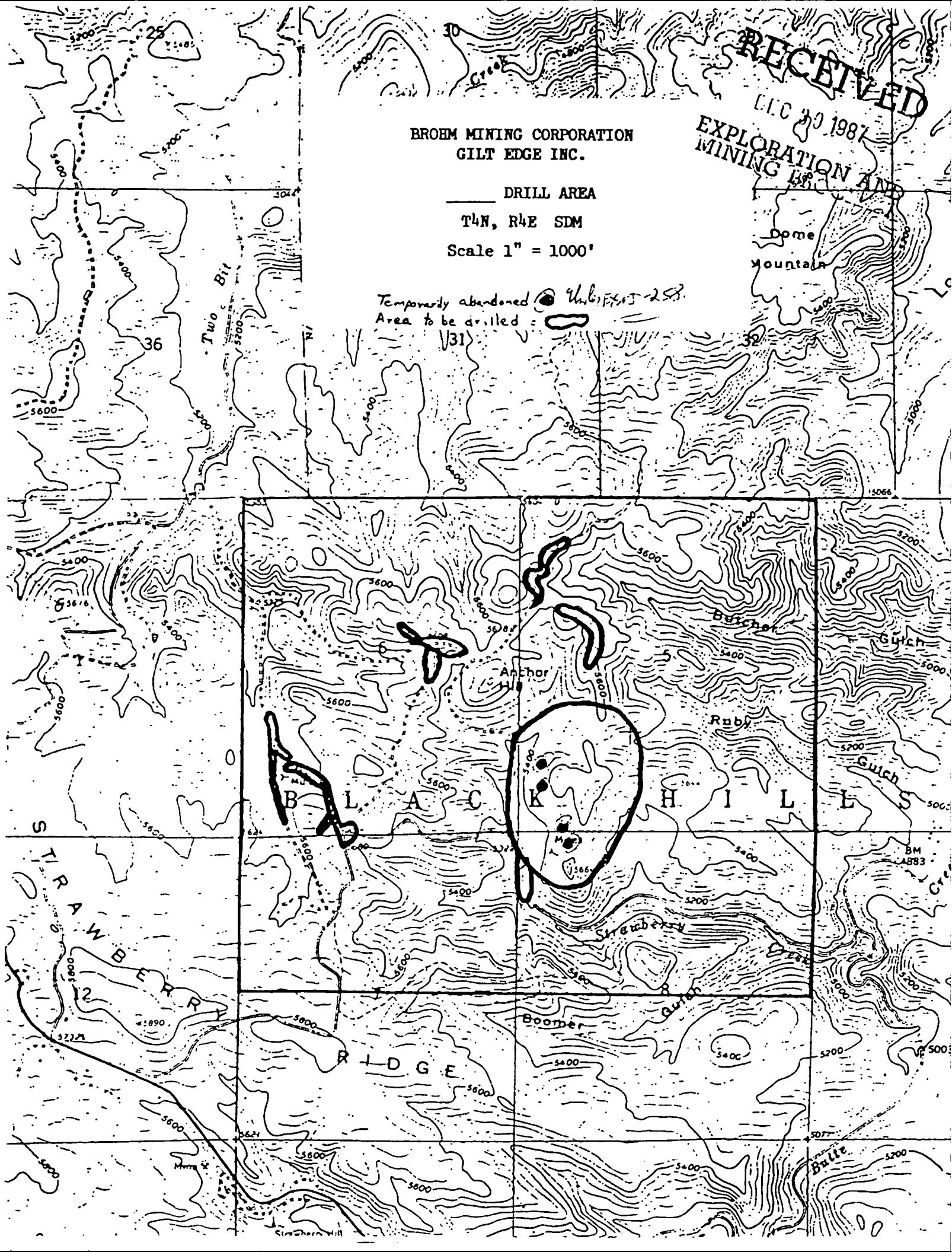
DRILL AREA

T4N, R4E SDM

Scale 1" = 1000'

Temporarily abandoned @ Unlabeled 258.  
Area to be drilled: 

31



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GILT EDGE INC.

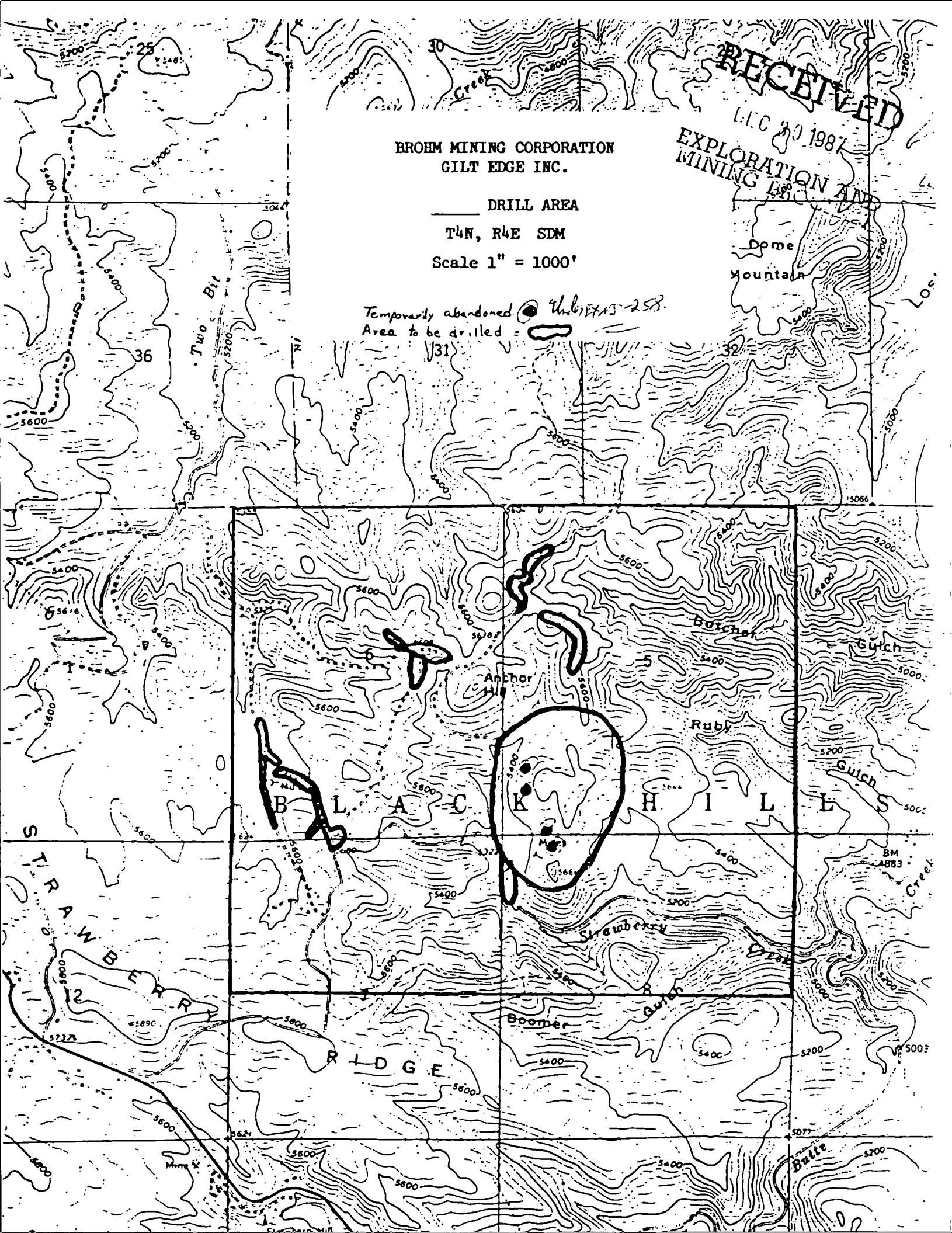
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DRILL AREA

T4N, R4E SDM

Scale 1" = 1000'

Temporarily abandoned  Unlabeled 258.  
Area to be drilled:   
1/31





map doesn't show hole  
locations, wells

- will drilling intercept  
aquifers whose depth  
is established (monitoring  
wells?)

BROHM MINING CORPORATION  
GILT EDGE INC.

DRILL AREA

T4N, R4E, S3M

Scale 1" = 1000'

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SECTION AND

